



# IEEE Standard for Hazardous Material Incident Management Message Sets for Use by Emergency Management Centers

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**Intelligent Transportation Systems Committee**

Sponsored by the  
IEEE Vehicular Technology Society

IEEE  
3 Park Avenue  
New York, NY 10016-5997, USA

7 July 2006

**IEEE Std 1512.3™-2006**  
(Revision of IEEE Std 1512.3-2002)



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# **IEEE Standard for Hazardous Material Incident Management Message Sets for Use by Emergency Management Centers**

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IEEE Vehicular Technology Society**

Approved 8 June 2006

**IEEE-SA Standards Board**

**Abstract:** This standard addresses the exchange of vital data about public safety issues involved in transportation-related events, through common incident management message sets. The message sets specified are consistent with the National Intelligent Transportation Systems Architecture and are described using Abstract Syntax Notation One (“ASN.1” or “ASN”) syntax. This standard comprises one companion volume of the family of incident management standards centered around a base standard: IEEE Std 1512®-2006. Other members of that family include other companion volumes, specifying incident management message sets for transportation-management-related data exchange and hazardous-material and public safety data exchange. Collectively, that family of standards shall be referred to as the “IEEE 1512 Family of Standards.” The goal of that family of standards is to support efficient communication for the real-time, interagency management of transportation-related events. Those events include incidents, emergencies, accidents, planned roadway closures, special events, and disasters caused by humans or natural events. Those events include any such event that impacts transportation systems or that causes a report to be received by an emergency management system, whether or not the event actually affects a transportation system and whether or not a response is required.

**Keywords:** 911, ASN.1, ATMS, CAD, Center-to-Center, Commercial Vehicles, Dangerous Goods, Data Exchange, EMC, Emergency Response, Emergency Services, EMS, Fire, Hazardous Materials, Hazmat, Incidents, Incident Response, Incident Management, Incident Command, Incident Management System, Intelligent Transportation Systems, Law Enforcement, Message Sets, Police, Public Safety, Traffic Incidents, Traffic Incident Management, Traffic Management, TMC, Transportation System Management

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# Introduction

This introduction is not part of IEEE Std 1512.3, IEEE Standard For Hazardous Material Incident Management Message Sets for Use by Emergency Management Centers.

The Incident Management Working Group was formed from a cross section of ITS (Intelligent Transportation System) and incident management practitioners in 1997 to address the problems and concerns of dispatching traffic management centers interacting with each other in the resolution of (primarily) roadway services disruptions (and certain other events on the highway), generically referred to as incidents. Advancing the greater coordination of these centers and their cross servicing over various jurisdictional boundaries is the primary objective of this Working Group.

This standard is one of several related standards in this area and deals primarily with the communication of vital data of a public safety and/or emergency management nature involved in transportation-related events. It is a companion volume to a Base Standard: IEEE Std 1512-2006. Other categories of communication, having to do with transportation management, hazardous material, and other cargo are addressed in other companion volumes generated by the Working Group. The Base Standard, this volume, and other companion volumes together comprise what shall be known as the IEEE 1512 Family of Standards.

The Base Standard includes more general introductory material for the family of standards, including the other companion volumes and the relationship between the family of standards and other ITS standards and the National ITS Architecture. That material will not be repeated here. Rather, the remainder of this section will present a statement of the problem this companion volume is to address and its goal.

## Problem statement

In the course of a transportation-related event where multiple public safety agencies are involved, there is a critical need to coordinate the management of the event among those agencies. Involved public safety agencies may include law enforcement, fire and rescue, emergency medical services (EMS), hazardous material management, traffic management, towing and recovery, and others. Each agency has a separate set of tasks, resources, and communication gear; yet the agencies need to coordinate their separate actions.

The challenge to be met by the IEEE 1512 Family of Standards is to specify message sets to support communication to coordinate those separate actions. That coordination extends to five categories of information, as follows:

- a) Situation awareness: A common-format rendition of the situation, i.e., the spatial layout, general aspects such as smoke and fire, what each agency is doing, and tracking several variables in a summary way: injured, response personnel, response equipment, witnesses, perpetrators, involved vehicles, and cargo. And as a special subject area of this volume, detailed information relating to the cargo and any hazardous aspects that it may contain and of which others need to be aware.
- b) Each agency's plan of action: A flexible format for agencies to disseminate their plans, so that each agency can take all other agencies' plans into account in its own planning and management. That exchange can support the specification of a single incident-wide action plan, or simply each agency specifying its own plan, to be followed separately but accounting for the plans of the other agencies.
- c) Asset management: An effective way for the agencies to share information about availability of assets for inter-agency management, and then to facilitate the inter-agency use of those assets, i.e., where Agency A requests that an asset of Agency B be dispatched to the incident. This approach extends to informing other agencies of the need for services such as law enforcement, evacuation, medical treatment, rescue, fire suppression, and hazardous material management.
- d) Warning information: Emergency evacuation, responder distress, cautions for responders, and "be on lookout for" information.

- e) Messaging overhead: Message priority, drill/not-a-drill, acknowledgment, ability to address by function as opposed to by agency name, and determining whether a center is functioning.

That presents us with the basis for stating the goal.

## Goal of this companion volume

The goal of this companion volume is to specify message sets to support the exchange of the five types of information just listed. More precisely, it is to specify the message sets that support that exchange, in combination with the message sets specified in the rest of the IEEE 1512 Family of Standards. As of this writing, that IEEE 1512 Family of Standards includes

- Base Standard: IEEE Std 1512-2006, Standard for Common Incident Management Message Sets for Use by Emergency Management Centers
- Companion Volume: IEEE Std 1512.1TM-2006, Standard for Traffic Incident Management Message Sets for Use by Emergency Management Centers
- Companion Volume: IEEE Std 1512.2TM-2005, Standard for Public Safety Incident Management Message Sets for Use by Emergency Management Centers

As part of its support of that exchange, this companion volume will support existing conventions and nomenclature for established practices in public safety incident management, in particular the National Incident Management System (NIMS)<sup>1</sup> and existing formats for incident action plans. At the same time, the message sets will not require that the local implementation use NIMS or any particular format for an incident action plan. Although in some local implementations any multiagency incident is coordinated with a single plan, in other local implementations, conventions are oriented around each agency having its own plan without any single, explicitly integrated plan. Both of those cases are supported by this standard. References to ICS and UCS in this volume shall be taken to also refer to the NIMS.

## Companion volumes

This standard provides information on additional messages, data frames, and data elements beyond those appearing in the Base Standard (IEEE Std 1512-2006) and the companion volumes listed above. To make full use of this information, the Base Standard, companion volumes, and other references to ITS and industry standards may also need to be employed. That is particularly true in the area of message set reuse where the contents of various elements have been taken from well-established practices, both within and outside that of the ITS and the public safety industries.

## The standard and use with data registries

The standard was developed in conjunction with entries designed to be made into a data registry. The following information may be useful to persons wishing to track the data structures described in this standard with those entries or in other similar registries.

In each of the data structures found in Clause 5 through Clause 7 of this standard, the following meta data fields are used and are equivalent to the named fields in a data registry. The mapping between these fields is as follows. The specific clause numbering and name of an entry is also the DESCRIPTIVE NAME of that entry in the registry (the part that follows after the “:” is the name used). The one or more paragraphs that then follow, headed “Use,” forms the DESCRIPTION entry. The final one or more paragraphs, headed “Remarks,” forms the REMARKS entry. The section headed “Used by,” contains linkages to other data

<sup>1</sup>U.S. Department of Homeland Security, [www.dhs.gov](http://www.dhs.gov), March 1, 2004. As of this writing, exact URL: <http://www.dhs.gov/interweb/assetlibrary/NIMS-90-web.pdf>.

then follow, headed “Use,” forms the DESCRIPTION entry. The final one or more paragraphs, headed “Remarks,” forms the REMARKS entry. The section headed “Used by,” contains linkages to other data structures that in turn refer to this one. In a data registry, the fields RELATED DATA CONCEPT and RELATIONSHIP TYPE may be used to convey this information, along with other relationships. The section headed by “ASN.1 Representation,” contains all ASN.1 defining code. In a data registry, this information is broken up among the fields: ASN.1 NAME, DATA TYPE, VALID VALUE RULE, and BODY. The ASN.1 NAME contains the formal ASN.1 Type Definition name of the object. The DATA TYPE contains the base type from which it is defined. The VALID VALUE RULE, or the BODY, then contains the various constraints, declared constants, enumerations values, and comments of the rest of the definition. In the case of data element entries, this information is found in the VALID VALUE RULE, whereas in the case of data frames and messages, this information is placed into the BODY field.

Other fields used in a data registry (such as UNITS or FORMULA) are, typically, not provided with content from this standard or are self evident and constant in nature. The SOURCE field is an example of this, and its value for all entries from this standard is IEEE Std 1512.3-2006.

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The Working Group wishes to acknowledge the assistance of Bancroft Scott and Paul Thorpe of Open Systems Solutions, Inc. (OSS) in providing the use of their ASN.1 tool suite compiler. The ASN.1 syntax appearing in this standard was validated using that tool suite compiler.



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([www.groundzerospirit.org](http://www.groundzerospirit.org))

**The IEEE 1512 Family of Standards is dedicated to the memory of those who lost their lives responding to the tragic events of September 11, 2001. The Working Group honors the men and women who continue to maintain vigilance in protecting freedom and security. It is our hope and expectation that these standards will enhance multijurisdictional communications.**

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# IEEE Standard for Hazardous Material Incident Management Message Sets for Use by Emergency Management Centers

## 1. Overview

This standard contains a framework for the exchange of data in messages sets for use by emergency management centers (EMCs) for hazardous material incidents.

This standard supplements IEEE Std 1512\*-2006,<sup>1</sup> henceforth called the “Base Standard” for the family of incident management message sets. The overview, scope, and purpose of IEEE Std 1512-2006 will not be repeated in this standard.

In the course of managing many transportation-related events, there is a need for sorting out and managing the often complex and partial information about the cargo and contents of involved vehicles and, in some cases, the contents of involved buildings. Often there are large gaps between the available information and what the incident commander needs to best manage the incident with regard to cargo and contents. In the ITS world, those gaps will often be spanned by off-site databases. The particular complexities of collecting the on-site data, then querying multiple off-site databases to gather all relevant information, is a task for local implementers. The task for this standard is to provide the framework for communication among the site and those databases to provide a flexible basis for that complex decision support process.

In supporting that decision process, this standard supports communication concerning vehicle cargo, contents, and building contents. Often a material that must be taken into account in incident management is not an involved vehicle’s cargo, but its fuel, as in a fuel spill. Thus, this standard extends to both vehicle cargo and other contents. In addition, the IEEE 1512 Family of Standards has within its scope all transportation-related events, which include, for example, building fires and building structural failures as they impact the transportation system. For example, a structural fire can involve significant road closure. Often buildings have contents, in particular, hazardous material, that must be taken into account in managing a transportation-related incident. Thus, this standard addresses not only vehicle cargo and contents, but also building contents.

Often information about cargo and/or contents is important for incident management whether the cargo and/or contents is labeled as hazardous material or hazardous waste. There are several examples: Many common solvents and cleaning compounds require no shipping papers, labels, or placards when shipped as new, yet become U.S. Environmental Protection Agency (EPA) regulated as hazardous waste, requiring shipping papers, markings, and placards, when they are used and dirty, indicating that they should be

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<sup>1</sup>Information on references can be found in Clause 2.

considered hazardous when they are spilled. Many combustible liquids in non-bulk packaging are excepted from hazard communication and packaging requirements, but they are U.S. Department of Transportation (DOT) regulated as hazardous when in bulk packaging. In particular, valuable cargo may have to be protected. Perishable cargo may call for special measures to maintain its value. Live animals may call for special measures to prevent escape; to keep them alive; to prevent them from inflicting injury to themselves, other animals, or humans; to handle manure and urine; and to handle carcasses if they perish. Thus, this standard addresses not only hazardous cargo and contents, but also any cargo and contents that could impact the management of a transportation-related incident.

This standard supports communication concerning cargo and contents in transportation-related events, whether those are associated with roadways, railways, or waterways.

## 1.1 Scope

This standard is a companion volume for IEEE Std 1512-2006, referred to here as the “Base Standard.” This standard specifies messages, data frames, and data elements for communicating general and cargo information to other responders in support of real-time interagency transportation-related incident management. It addresses the unique disciplines associated with communications dealing with the control and confinement of hazardous materials during and after an incident.

The Base Standard specifies messages, data frames, and data elements for the basic underlying communication involved in real-time interagency transportation-related incident management. Refer to the Base Standard for specification of the scope of the combination of the Base Standard and companion volumes such as this one. Together, the Base Standard and companion volumes shall be referred to as the “IEEE 1512 Family of Standards.”

Clause 5 and Clause 6 of this standard present the specified messages, data frames, and data elements in ASN.1 format and in XML formats.

## 1.2 Purpose

This standard provides a framework for the exchange of messages concerning cargo and content of vehicles and content of buildings involved in transportation-related events, to support the management of those events. The clearest examples of the need for these messages are in cases where the cargo and/or content include hazardous material or hazardous waste. However, these messages are also often needed where the cargo and/or content is nonhazardous, as described in 1.1.

This standard is part of the IEEE 1512 Family of Standards. The purpose of that family of standards as a whole is presented in the Base Standard and will not be repeated here.

In more detail, the purpose of this standard is to support the communication necessary to take the real-world, available-information situation confronting the incident manager, and use off-site databases to make further information available to that manager, to best support this individual in managing the event. That calls for messages that support communications of whatever information is available, often quite partial, to off-site databases and resources, and (often) then among off-site databases and resources, to accomplish the following two decision-support functions:

- a) To retrieve further information about what the cargo and/or contents are, based on what are often quite partial cues available on site. That information is available in off-site databases managed by shippers, carriers, and fleet and freight management centers.
- b) To retrieve information about the characteristics of the cargo and/or contents that is important for incident management, such as toxicity, flammability, danger of explosion, size of a potential toxic plume, environmental damage, recommended set-back distances, and evacuation areas.

## 2. Normative references

The following documents shall be used, when applicable, in the process of populating and developing the message sets of this standard. The specific revision and issued date stated below shall be used for each document. When the following documents are superseded by an approved revision, the revised version shall be reviewed for applicability.

The references cited below shall be included in the references of the other companion volumes of this standard unless specifically excepted.

APTA TCIP-S-001 (Draft 2.7.1, July 2005), Draft Standard for Transit Communications Interface Profiles.<sup>2</sup>

ASN.1:1997, Abstract Syntax Notation One.<sup>3</sup>

Code of Federal Regulations pertaining federal hazmat transportation regulations, notably 49 CFR parts 100 to 185.<sup>4</sup>

IEEE Std 1488™-2000, IEEE Trial-Use Standard for Message Set Template for Intelligent Transportation Systems.<sup>5, 6</sup>

IEEE Std 1489™-1999, IEEE Standard for Data Dictionaries for Intelligent Transportation Systems.

IEEE Std 1512®-2006, IEEE Standard for Common Incident Management Message Sets for Use by Emergency Management Centers.

IEEE Std 1512.1™-2003, IEEE Standard for Transportation Incident Management Message Sets for Use by Emergency Management Centers.

IEEE Std 1512.2™-2004, IEEE Standard for Public Safety Incident Management Message Sets for Use by Emergency Management Centers.

ISO/IEC 8824-1:1998, Information technology—Abstract Syntax Notation One (ASN.1): Specification of basic notation.<sup>7</sup>

ISO/IEC 8824-2:1998, Information technology—Abstract Syntax Notation One (ASN.1): Information object specification.

ISO/IEC 8824-3:1998, Information technology—Abstract Syntax Notation One (ASN.1): Constraint specification.

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<sup>2</sup> APTA Standards are available from the Institute of Transportation Engineers, 1099 14th Street NW, Suite 300 West, Washington, DC 20005-3438, USA (<http://www.ite.org/standards/index.html>).

<sup>3</sup> ASN.1:1997 is available from the World Wide Web at the following site: <http://asn1.elibel.tm.fr>.

<sup>4</sup> CFR publications are available from the Superintendent of Documents, U.S. Government Printing Office, P.O. Box 37082, Washington, DC 20013-7082, USA (<http://www.access.gpo.gov/>).

<sup>5</sup> IEEE publications are available from the Institute of Electrical and Electronics Engineers, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331, USA (<http://standards.ieee.org/>).

<sup>6</sup> The IEEE standards or products referred to in this clause are trademarks of the Institute of Electrical and Electronics Engineers, Inc.

<sup>7</sup> ISO/IEC publications are available from the ISO Central Secretariat, Case Postale 56, 1 rue de Varembe, CH-1211, Genève 20, Switzerland/Suisse (<http://www.iso.ch/>). ISO/IEC publications are also available in the United States from Global Engineering Documents, 15 Inverness Way East, Englewood, Colorado 80112, USA (<http://global.ihs.com/>). Electronic copies are available in the United States from the American National Standards Institute, 25 West 43rd Street, 4th Floor, New York, NY 10036, USA (<http://www.ansi.org/>).

ISO/IEC 8824-4:1998, Information technology—Abstract Syntax Notation One (ASN.1): Parameterization of ASN.1 specifications.

ITE TMDD, Standards for Functional Level Traffic Management Data Dictionary (TMDD), Standard No. TM 1.01.4.<sup>9</sup>

ITE TMDD, Standard for Functional Level Traffic Management Data Dictionary (TMDD), Standard No. TM 1.03, Version 2.1, March 2006.

NFPA 704, Standard for the Identification of the Fire Hazards of Materials for Emergency Response, 2001 Edition.<sup>10</sup>

NTCIP 2306, Application Profile for XML Message Encoding and Transport in ITS Center to Center Communications, v 00.50, User Comment Draft, March 2005.<sup>11</sup>

SAE J2354, Message Sets for Advanced Traveler Information System (ATIS), Version 2, May 2004.<sup>12</sup>

SAE J2540, Messages for Handling Strings and Look-Up Tables in ATIS Standards, July 2002.

SAE J2540-2, ITIS (International Traveler Information Systems) Phrase Lists, Version 1, February 2002, amendment May 2004.

SAE J2630, Converting ATIS Message Standards From ASN.1 To XML, Version 1, December 2003.<sup>13</sup>

Other documents defined in IEEE Std 1512-2006 remain as cited and are included herein by reference.

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<sup>9</sup> Standards for Functional Level Traffic Management Data Dictionary (TMDD) are available from Institute of Transportation Engineers, 1099 14th Street, NW, Suite 300 West, Washington, DC 20005-3438 USA (<http://www.ite.org/standards/index.html>).

<sup>10</sup> NFPA publications are available from Publications Sales, National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101, USA (<http://www.nfpa.org/>).

<sup>11</sup> Copyright 2004 by the American Association of State Highway and Transportation Officials (AASHTO), the Institute of Transportation Engineers ITE), and the National Electrical Manufacturers Association (NEMA) (<http://www.ntcip.org>).

<sup>12</sup> SAE publications are available from the Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15096, USA (<http://www.sae.org/>).

### 3. Definitions, acronyms, and abbreviations

#### 3.1 Definitions

For the purposes of this standard, the following terms and definitions apply. *The Authoritative Dictionary of IEEE Standards* [B13]<sup>12</sup> should be referenced for terms not defined in this clause.

**3.1.1 2004 Emergency Response Guidebook (ERG2004):** Developed jointly by Transport Canada (TC), the U.S. Department of Transportation (DOT), and the Secretariat of Transport and Communications of Mexico (SCT) for use by fire fighters, police, and other emergency services personnel who may be the first to arrive at the scene of a transportation incident involving dangerous goods. It is primarily a guide to aid first responders in quickly identifying the specific or generic hazards of the material(s) involved in the incident, and protecting themselves and the general public during the initial response phase of the incident. For the purposes of this guidebook, the “initial response phase” is that period after arrival at the scene of an incident during which the presence and/or identification of dangerous goods is confirmed, protective actions and area securement are initiated, and assistance of qualified personnel is requested. It is not intended to provide information on the physical or chemical properties of dangerous goods.

**3.1.2 adjustable bogie:** Trailer axles that are adjustable in a longitudinal (fore/aft) manner to transfer greater or lesser trailer weight on the towing vehicle axles.

**3.1.3 agitator body:** A truck body designed and equipped to mix concrete in transit.

NOTE—Refer to Figure 1.<sup>13</sup>



Figure 1—Example of an agitator body type

<sup>12</sup> The numbers in brackets correspond to those of the bibliography in Annex A.

<sup>13</sup> Notes in text, tables, and figures are given for information only and do not contain requirements needed to implement the standard.

**3.1.4 automobile transporter body:** Truck or trailer body designed for the transportation of vehicles.

NOTE—Refer to Figure 2.



**Figure 2—Example of an automobile transporter**

**3.1.5 balloon freight:** Light, bulky cargo.

**3.1.6 bobtail:** A truck tractor moving without a trailer. Also, a straight tank truck carrying a propane cargo tank.

NOTE—Refer to Figure 3.



**Figure 3—Example of a bobtail**

**3.1.7 bottlers body:** Truck body designed for hauling cased, bottled beverages.

**3.1.8 bottom dump:** Trailer body designed to dump its cargo through gates in bottom or floor of the trailer.

NOTE—Refer to Figure 4.



**Figure 4—Example of a bottom dump**

**3.1.9 B-trains:** A combination consisting of a tractor and two semitrailers, the second trailer coupled to the first trailer by use of a fifth trailer by use of a fifth wheel, which is mounted directly behind cargo body on the lead semitrailer.

**3.1.10 bulk packaging:** A packaging, other than a vessel or a barge, including a transport vehicle or freight container, in which hazardous materials are loaded with no intermediate form of containment and which has (1) a maximum capacity greater than 450 L (119 gallons) as a receptacle for a liquid; (2) a maximum net mass greater than 400 kg (882 pounds) and a maximum capacity greater than 450 L (119 gallons) as a receptacle for a solid; or (3) a water capacity greater than 454 kg (1000 pounds) as a receptacle for a gas as defined in 49CFR Sec. 173.115.

NOTE—Refer to Figure 5.



**Figure 5—Examples of bulk packaging**

**3.1.11 cab, conventional:** A tractor on which the cab is behind the engine. *See also:* **snub-nose**.

**3.1.12 cab-over-engine (COE):** A tractor on which the cab is located over the engine.

**3.1.13 cargo tank:** A bulk packaging designed to transport liquid or gaseous cargo. The tank may be mounted on a truck, trailer, or semitrailer.

NOTE—Refer to Figure 6.



**Figure 6—Example of a cargo tank**

**3.1.14 carrier:** A person engaged in the transportation of passengers or property by land or water or by civil aircraft.

**3.1.15 clean bore tank:** A single tank with one compartment.

**3.1.16 combination vehicle:** A truck or truck-tractor coupled to one or more trailers, also referred to as a “rig.” *Syn:* **rig**.

**3.1.17 container (van body type):** A truck or trailer body provided with means for ready removal from an attachment to a vehicle.

**3.1.18 converter gear or dolly:** The coupling device composed of one or two axles and a fifth wheel by which a semitrailer can be coupled to the rear of a tractor-trailer combination, forming a double-bottom rig.

**3.1.19 convertible:** A truck or trailer that can be used either as a flat bed or open top by means of removable side panels.

**3.1.20 dangerous goods:** *See:* **hazardous materials**.

**3.1.21 diamond ratings:** (Slang) *See* NFPA 704.<sup>16</sup>

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<sup>16</sup> Information on references can be found in Clause 2.

**3.1.22 double bottom or triple bottom:** Two or three semitrailers attached as a unit and towed by a truck tractor.

**3.1.23 double bottoms:** *See:* **doubles.**

**3.1.24 doubles:** A combination vehicle consisting of a tractor, a semitrailer and a full trailer, coupled together. *Syn:* **twins, twin trailers, and double bottoms.**

**3.1.25 dromedary tractor:** A tractor with a cargo body placed between the fifth wheel and the cab.

**3.1.26 drop frame:** A “U”-shaped trailer frame. The objective is to either (1) lower the overall height of large/bulky loads or (2) maximize the available volume for low-density cargo.

**3.1.27 dry bulk tank:** Large cargo tank-like unit designed to move solid or dry materials like cement or flour. Some dry bulk tanks carry hazardous materials.

**3.1.28 Environmental Protection Agency (EPA) hazardous waste marking:** Package marking required by 40CFR Sec 262.32, to be displayed on non-bulk packagings of hazardous waste, which includes the DOT Proper Shipping Name, UN Identification number, and other information as required by the Environmental Protection Agency (EPA).

NOTE—Refer to Figure 7.

**HAZARDOUS WASTE**  
**FEDERAL LAW PROHIBITS IMPROPER DISPOSAL**  
IF FOUND CONTACT THE NEAREST POLICE OR  
PUBLIC SAFETY AUTHORITY OR THE  
U.S. ENVIRONMENTAL PROTECTION AGENCY

PROPER D.O.T.  
SHIPPING NAME \_\_\_\_\_ UN OR NA NO. \_\_\_\_\_

**GENERATOR INFORMATION**

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_ PHONE \_\_\_\_\_

CITY \_\_\_\_\_ STATE \_\_\_\_\_ ZIP \_\_\_\_\_

EPA ID. NO. \_\_\_\_\_ EPA WASTE NO. \_\_\_\_\_

ACCUMULATION START DATE \_\_\_\_\_ MANIFEST DOCUMENT NO. \_\_\_\_\_

**CONTAINS HAZARDOUS OR TOXIC WASTES**

PROPER SHIPPING NAME \_\_\_\_\_

TECHNICAL CHEMICAL NAME \_\_\_\_\_

UN OR NA ID. NO. \_\_\_\_\_

D.O.T. PROPER SHIPPING NAME AND UN OR NA NO. WITH PREFIX

**HANDLE WITH CARE!**

Figure 7—Example of an EPA hazardous waste marking

**3.1.29 fuel tank:** The tanks that provide fuel to engines of the truck or truck tractor.

**3.1.30 full trailer:** Vehicle designed to be drawn by another vehicle and constructed so no part of its weight rests on the towing vehicle. Usually towed by a truck.

**3.1.31 furniture van body:** Truck body designed for the transportation of household goods; usually a van of drop-frame construction.

NOTE—Refer to Figure 8.



**Figure 8—Example of a furniture van**

**3.1.32 hazard classes and divisions:** Many hazardous materials are required to be identified in transportation by the hazard class or division definitions they meet. Some hazard classes are divided into divisions. Some materials exhibit multiple hazards. The resulting categories of hazard classes and divisions are organized into number sets with known meanings.

NOTE—A listing of these sets can be found on page 14 of the 2004 Emergency Response Guidebook, which is derived from 49CFR Sec. 172.101. A set can be assigned for each class or division. The classes and divisions are enumerated in the clause on Data Elements.

**3.1.33 hazard identification codes:** A hazardous materials marking required by European and South American regulations consisting of an orange panel with two sections. The top section displays two to four figures indicating hazard characteristics or warnings, and the lower section displays the United Nations identification number of the material.

**3.1.34 hazard identification numbers:** *See: hazard identification codes.*

**3.1.35 hazard marking:** Marking is the display of United Nations (UN) identification numbers and/or the Department of Transportation shipping name of the hazmat on packaging used to transport hazardous materials. Marking may also include additional hazard warnings (Inhalation Hazard, HOT, and others) and package specifications.

NOTE—In most crash situations, the markings on non-bulk packages (drums and boxes) will not be visible because the cargo is inside a closed vehicle. Marking of UN numbers and shipping names on commercial vehicles or bulk tanks is most relevant to this standard. Non-hazmat first responders will often only notice the placards with ID numbers and report “it has got a 1203 placard.” The report of even just the ID number to the dispatcher still is of great value if it can be sent to the responders.

**3.1.36 hazardous material (hazmat):** As defined by the U.S. Department of Transportation: “A substance or material, which has been determined by the Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce, and which has been so designated. The term includes hazardous substances, hazardous wastes, marine pollutants, and elevated temperature materials as defined in this section, materials designated as hazardous under the provisions of section 171.101 of this subchapter, and materials that meet the defining criteria for hazard classes and divisions in part of 173 of this subchapter.” (adapted from Title 49, Code of Federal Regulations, Section 171.8)

**3.1.37 hazardous materials:** As defined by the U.S. Department of Transportation, “Hazardous material means a substance or material, which has been determined by the Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce, and which has been so designated. The term includes hazardous substances, hazardous wastes, marine pollutants, and elevated temperature materials as defined in 49CFR Sec. 171.8, materials designated as hazardous under provisions of 49CFR Sec. 172.101, and materials meeting the defining criteria for hazard classes and divisions in 49CFR Part 173.” (adapted from Title 49, Code of Federal Regulations, Section 171.8)

**3.1.38 heavy trailer:** A trailer, typically of a drop-frame construction, designed to carry heavy loads.

NOTE—Refer to Figure 9.



**Figure 9—Example of a heavy trailer**

**3.1.39 HM packaging types:** Abandoned packages (illegal dumping) of hazmat are a large problem nationwide, and dumping becomes a hazmat transportation response when it occurs on a highway right of way. Furthermore, van trucks and trailers often transport non-bulk hazmat packaging. Rollovers of van units containing large numbers of non-bulk packages can take longer to clear than bulk units like cargo tanks, because of the labor needed to move hundreds of smaller containers.

NOTE—In this standard, a non-bulk packaging type is a packaging with a capacity of 450 L or less for liquids. The U.S. DOT divides all hazmat packaging into two categories: non-bulk and bulk. A non-bulk packaging is a packaging with a capacity of 119 gallons (450 L) or less for liquids. The Other definitions exist for non-bulk packages for solids and gases. Packages with capacities greater than 450 L are bulk packaging. Non-bulk packaging includes drums, cylinders, pails, boxes, and bags (although these can also exist in bulk form). Refer to Figure 10.



**Figure 10—Typical examples of non-bulk packaging (top) and bulk packaging (bottom)**

**3.1.40 Hazardous Materials Identification System (HMIS):** A product labeling system developed by the National Paint and Coatings Association (NPCA) and similar in many respects to the NFPA 704 system. HMIS labels always appear as a rectangle-shaped block of four-colored bars with a blue “health” bar on top, a red “flammability” below that, followed by a yellow “reactivity” bar and a white “PPE” bar. At times, there may be additional space on the label for other information, including product name, supplemental warnings, manufacturer information, or additional information. HMIS is touted by its owner as “designed to aid employers and their employees in day-to-day compliance with OSHA's Hazard Communication Standard.” The rating criteria used for categories of flammability and reactivity are identical to that used by NFPA 704. The ratings in the Health category differ as HMIS is also concerned with chronic as well as acute health hazards. The presence of an asterisk indicates a chronic health hazard. Recently the label was redesigned to give the asterisk a box of its own in the label. In older labels (which are expected to be prevalent for many years), the mark is combined with the numerical rating value.

NOTE—Refer to Figure 11.



**Figure 11—Typical (blank) HMIS label**

**3.1.41 hopper body:** Truck or trailer body capable of discharging its load through a bottom opening without tilting.

**3.1.42 horse van body:** Truck designed for the transportation of valuable saddle horses.

**3.1.43 identification number:** The four-digit number assigned by the U.S. Department of Transportation (DOT) hazardous material regulations, or the United Nations (UN) dangerous goods regulations, to a hazardous material. Numbers may be prefixed by either NA or UN and are found in ERG2004, and the DOT and UN regulations. In the ERG, this value is called the “material number.” Many materials (each with a proper shipping name of its own) can share the same material number. For example, all types of common gasoline are numbered 1203.

NOTE—The term *identification number* is preferred over material number or slang such as “UN number” in this standard.

**3.1.44 interline freight:** Tonnage passing over the lines of two or more carriers. The interchange is termed an interline movement. Freight moving from the point of origin to its destination over the lines of two or more transportation lines, also known as interlining. For example, many carriers are regional. A carrier that accepts a load for delivery outside of its normal working area will bring the material to a freight terminal and interline the freight to a carrier that services the location of the consignee.

**3.1.45 intermodal (IM) containers, freight containers:** Freight boxes designed to be moved from one mode of transportation to another. IM containers may be stacked on ship, removed and placed on a chassis trailer, or railroad car.

NOTE—Refer to Figure 12.



**Figure 12—Example of a freight container**

**3.1.46 intermodal portable tank:** A type of container tank designed to be moved from one mode of transportation to another. *See also:* UN portable tank; large packaging.

NOTE—Refer to Figure 13.



**Figure 13—Example of an intermodal portable tank**

**3.1.47 labels:** Graphic communications devices that communicate the hazard class or division of a hazardous material by use of color and design, as specified in 49CFR Part 172, Subpart E.

**3.1.48 large packaging:** An outer packaging that contains articles or inner packaging. It is designed for mechanical handling, exceeds 400 kg net mass or 450 L capacity, but has a volume not more than 3 m<sup>3</sup>.

**3.1.49 legends:** A term of art used to refer to various markings found on the outside of vehicles (power units), trailers (cargo units), packages, and products that may be helpful to document in the message set for use in the response to the incident.

**3.1.50 log body:** Truck or trailer body designed for the transportation of long items. *See also:* **pole trailer**.

**3.1.51 marking:** A descriptive name, identification number, instructions, cautions, weight, specification, or UN marks, or combinations thereof, required by the U.S. Department of Transportation (DOT) hazardous materials transportation regulations.

**3.1.52 material number:** A number used to identify the type and properties of a material in the ERG, and properly called an “Identification Number” in various regulations. Many materials (each with a proper shipping name of its own) can share the same material number. For example, all types of common gasoline are numbered 1203.

**3.1.53 micrometeorology:** The meteorology of a small area. Used in particular for plume modeling for hazardous or visually impeding plumes. Typically includes wind direction and speed, temperature, and relative humidity.

**3.1.54 Material Safety Data Sheet (MSDS):** A collection of information concerning the properties and safety handling of a material. Commonly used with any chemical substance and typically available from the manufacturer, the seller, or the agent, often by way of websites or provided in printed form with the

product. The format of these can vary widely. Information contained on MSDS can be useful to responders. The specific legal requirements for MSDS can be found at 29CFR Sec. 1910.1200.

**3.1.55 NFPA 704:** Referring to the four-diamond legend found on buildings and objects that reflects the hazard degree of the contents. Properly called an NFPA diamond, and based on the 704 standard developed by NFPA, these symbols are used to alert responders to the contents of the building, tank, etc., and provide a gross indication of flammability, instability, and other data. They are similar in intent to the class-divisions numbering found on hazmat placards and labels. The four sections contain ratings (ranging from one to four, with four as the most severe) as follows. The upper triangle (red) is the fire hazard and flash point rating. The left triangle (blue) is the health hazard rating. The right triangle (yellow) is the instability rating. The lower triangle (white) is used to reflect any specific hazard indication.

NOTE—Refer to Figure 14.

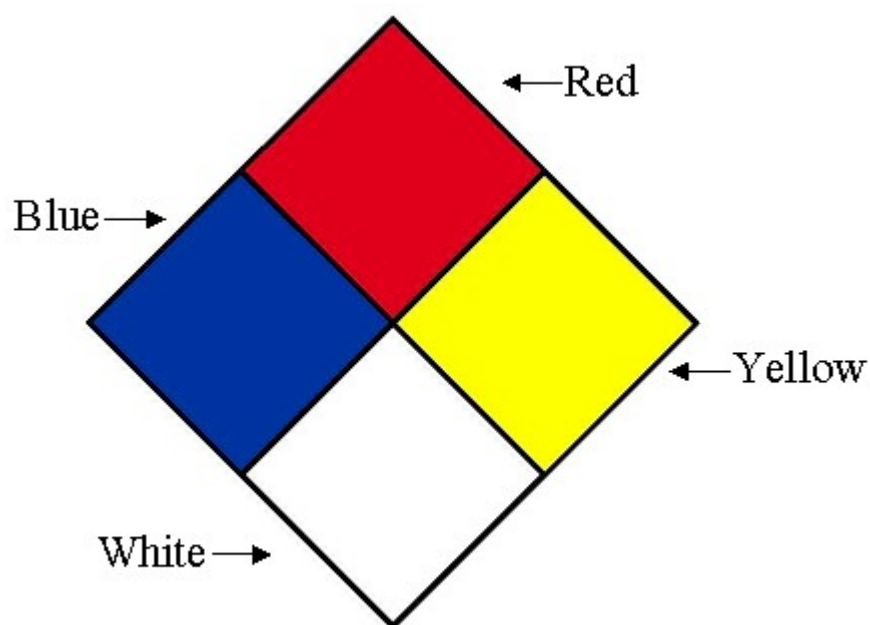


**Figure 14—Typical NFPA 704 diamond sign (no rating data added)**

**3.1.56 NFPA Diamond:** *See: NFPA 704.*

**3.1.57 nurse tank:** A tank mounted on a farm wagon, often used for transport of anhydrous ammonia to farm locations; however, other uses also exist. These tanks are occasionally converted to transport propane or other flammable gases. If a tank contains  $\text{NH}_3$ , it is a nurse tank; if it contains LPG, it is a nonspecification cargo tank built and (presumably) marked to ASME Code.

NOTE—Refer to Figure 15.



Figure 15—Example of a nurse tank

**3.1.58 oversized vehicle:** Any vehicle whose weight and/or dimensions exceeds state regulations.

**3.1.59 package:** The package unit is a term of art used to refer to a portion of cargo (which may be found in a cargo-carrying device such as a trailer, a power unit such as the trunk of a vehicle, or the cargo area of a flat bed). Corrugated cardboard boxes, or 55 gallon drums, are examples. The package unit is a part of the “contents” data structure that describes the type and condition of various cargo.

**3.1.60 placards:** Graphic warning devices designed to give the hazard class or division of the hazardous materials carried in a vehicle or railroad car. There are different placards for each class or division except 6.2. Placards are color coded and must be at least 273 mm on a side and be displayed on all four sides of the vehicle.

NOTE—The U.S. Department of Transportation defines hazmat placards, both the shapes and the color codes to be used, and the size (10.8 in or 273 mm). Consult 49CFR Part 172, Subpart F for these definitions. Placards display the hazard class number in the bottom corner. Some vehicles are required to display more than one placard, and some will display three or more. Refer to Figure 16.



Figure 16—Examples of some common placards

**3.1.61 pole trailer:** A trailer designed to move long or irregular loads like poles, pipes, or beams, where the cargo acts as a support member of the unit.

**3.1.62 power unit:** A term of art to refer to the tractor portion of a trailer tractor or any other powered vehicle (as opposed to a hauled unit such as a trailer). Semi-tractors, train engines, and passenger vehicles are examples. Each power unit described by instances of the message set contains unique numbering and data values related to its contents, registration, overall type, and current status.

**3.1.63 private motor carrier:** A carrier that transports its property or materials in vehicles it owns, leases, or controls.

**3.1.64 pup:** (Slang) A short four-wheel trailer that is pulled behind a semitrailer or a straight truck.

**3.1.65 rig:** (Slang) Truck; tractor-semitrailer; truck and full trailer, or other combinations of vehicles.

**3.1.66 saddle tank:** Barrel-type fuel tanks that hang from the sides of the trailer's frame. These large fuel tanks can vary considerably in capacity and are found on some trailers.

NOTE—Refer to Figure 17.



**Figure 17—Example of a saddle tank**

**3.1.67 semitrailer:** A vehicle designed to be pulled by another vehicle and constructed so some of its weight rests on the self-propelled towing motor vehicle. May be a tank, van-box, flatbed, end dump, belly dump, or other. Usually pulled by a truck tractor.

**3.1.68 shipper:** A person or entity that offers hazardous material for transportation.

**3.1.69 single axle:** (Slang) Refers to either a tractor with one front axle and one rear axle or a semitrailer with only one axle.

**3.1.70 sleeper:** Truck with a sleeping compartment in the cab.

**3.1.71 sliding tandem:** An adjusted bogie beneath the trailer that can be moved forward or backward to distribute the weight between tractor and trailer axles.

**3.1.72 straight truck:** A truck with the body and engine mounted on the same chassis, (as contrasted to a combination unit such as tractor-trailer).

**3.1.73 tag axle:** The rearmost axle of a tandem-axle tractor if that axle serves only to support additional gross weight. A tag axle does not transmit power to the roadway.

**3.1.74 tandem axle:** An assembly of two axles, either, none, or both of which may be powered.

**3.1.75 tank trailer:** A cargo tank mounted on a semitrailer or full trailer. *See also:* **tanker.**

NOTE—Refer to Figure 18.



**Figure 18—Example of a tank trailer**

**3.1.76 tank truck:** A truck with a cargo tank permanently attached to it.

NOTE—Refer to Figure 19.



**Figure 19—Example of a tank truck**

**3.1.77 tanker:** *See: tank trailer.*

**3.1.78 trailer:** Includes several types designed to be pulled by trucks or truck tractors.

**3.1.79 trash hauler:** A type of straight truck with a mounted apparatus for the collection and containment of trash.

NOTE—Refer to Figure 20.



**Figure 20—Example of a trash hauler**

**3.1.80 truck or straight truck:** Any self-propelled commercial motor vehicle, except for a truck tractor.

**3.1.81 truck tractor or semi-tractor:** Self-propelled motor vehicle designed for, and primarily used for, pulling other vehicles.

**3.1.82 tube trailer:** A compressed gas trailer consisting of several long tubes or compressed gas cylinders.

NOTE—Refer to Figure 21.



**Figure 21 —Example of a tube trailer**

**3.1.83 twin trailers:** *See:* doubles.

**3.1.84 twins:** *See:* doubles.

**3.1.85 United Nations (UN) portable tank:** A UN portable tank is a tank with a capacity greater than 450 L. It is built to meet UN standards, similar to intermediate bulk containers; its capacity and size is large enough to require mechanical handling.

**3.1.86 van or box trailer:** A trailer with a permanently installed cargo box or van designed to haul general freight.

**3.1.87 van truck:** A truck with a van box permanently attached.

**3.1.88 Workplace Hazardous Materials Information System (WHMIS):** The Canadian government regulation equivalent to the OSHA standard Hazard Communication Standard (HCS) in the United States. In many ways, the WHMIS system of labeling is similar to the HMIS system and may be found as a set of labels and markings on goods being transported. Neither WHMIS nor HMIS is a substitute for proper shipping placards, labels, and markings.

**3.1.89 yard mule:** (Slang) Tractor used to move semitrailers around the terminal yard.

### 3.2 Acronyms and abbreviations

|        |                                                                    |
|--------|--------------------------------------------------------------------|
| AASHTO | American Association of State Highway and Transportation Officials |
| AHO    | available for hand off                                             |
| ASN.1  | abstract syntax notation one                                       |
| ATIS   | advanced traveler information systems                              |
| BS     | IEEE Std 1512-2006 base standard                                   |
| CAD    | computer-aided dispatch                                            |
| CCP    | change center properties                                           |
| CFR    | Code of Federal Regulations                                        |
| CIE    | close incident event                                               |
| COFC   | container on flat car                                              |
| CORBA  | common object request broker architecture                          |
| DB     | database                                                           |
| DCO    | disable center on-line                                             |
| DE     | data element                                                       |
| DF     | data frame                                                         |
| DHS    | Department of Homeland Security                                    |
| DOJ    | Department of Justice                                              |
| DOT    | Department of Transportation                                       |
| DSRC   | dedicated short-range communications                               |
| E911   | enhanced 911                                                       |
| ECO    | establish center on-line                                           |
| ECP    | establish center properties                                        |
| EMS    | emergency medical service                                          |
| EOC    | emergency operations center                                        |
| ERG    | 2004 Emergency Response Guidebook                                  |
| ERM    | event reporting message                                            |
| FBI    | Federal Bureau of Investigation                                    |
| FR     | functional requirement                                             |
| GHO    | grant hand off                                                     |
| GPS    | global positioning system                                          |
| hazmat | hazardous materials (slang)                                        |
| HM     | hazardous material or “hazmat” (slang)                             |

|       |                                                                       |
|-------|-----------------------------------------------------------------------|
| HMIS  | hazardous materials identification system                             |
| IAP   | incident action plan                                                  |
| ICAO  | International Civil Aviation Organization                             |
| ID    | identification                                                        |
| IDX   | incident description                                                  |
| IM    | incident management                                                   |
| IMDG  | international maritime dangerous goods (Code)                         |
| IMS   | incident management system                                            |
| ISO   | International Standards Organization                                  |
| ISP   | information service provider                                          |
| ITE   | Institute of Transportation Engineers                                 |
| ITIS  | international traveler information system                             |
| ITS   | intelligent transportation system                                     |
| LRMS  | location reference message set                                        |
| MIE   | merge incident event                                                  |
| MSDS  | material safety data sheet                                            |
| NA    | North America                                                         |
| NIE   | new incident event                                                    |
| NIMS  | National Incident Management System                                   |
| NPCA  | National Paint and Coating Association                                |
| NTCIP | National Transportation Communications for ITS Protocol               |
| ORM-D | other regulated materials (consumer commodity)                        |
| OSHA  | Occupational Safety and Health Administration                         |
| PHMSA | Pipeline and Hazardous Materials Safety Administration, formerly RSPA |
| PHO   | poll for hand off                                                     |
| PID   | public incident description                                           |
| PIO   | public information officer                                            |
| PSAP  | public safety answering point                                         |
| PSN   | proper shipping name                                                  |
| RF    | radio frequency                                                       |
| RHO   | request hand off                                                      |
| RIN   | request information                                                   |
| RIT   | required information type                                             |
| RSPA  | Research and Special Programs Administration (DOT); see PHMSA         |
| RUI   | request unverified incidents                                          |

|        |                                                                  |
|--------|------------------------------------------------------------------|
| RVI    | request verified incidents                                       |
| SAE    | Society of Automotive Engineers                                  |
| SDO    | standards development organization                               |
| SIE    | split incident event                                             |
| TCC    | traffic control center                                           |
| TCIP   | transit communications interface profiles                        |
| TCP/IP | transmission control protocol/Internet protocol                  |
| TMC    | traffic management center                                        |
| TMDD   | traffic management data dictionary                               |
| TOC    | traffic operations center                                        |
| TOFC   | trailer on flat car                                              |
| UN     | United Nations                                                   |
| VIN    | vehicle identification number                                    |
| WHMIS  | workplace hazardous materials information system (Canadian term) |
| XML    | eXtensible Markup Language                                       |

## 4. Structure of the standard

This clause lays out a logical progression, from a statement of the problem and the key functions the communication system is to perform (4.1), to the resulting requirements at a general level (4.2), to the resulting requirements at a more specific level (4.3), and finally, to the resulting requirements worded as bases for message sets and data frames (DFs) (4.4).

### 4.1 The problem and functions

The problem:

In the course of a transportation-related incident, often the cargo and/or contents carried by involved vehicles, or in involved buildings, can figure importantly in the incident: in the hazards present, in how those hazards should be managed, and how the overall incident should be managed. Yet in the course of an incident, the information about that cargo and/or contents may be only partial (e.g., only a placard, giving only information about the hazard class or divisions of hazardous material carried, and sometimes even less than that). So incident management should be supported by communicating with off-site parties to determine what the cargo and/or contents are and how to manage the incident given the characteristics of that cargo and/or contents.

That problem leads us to the basic mission for the messages, data frames, and data elements (DEs) specified in this volume:

To support the communication of information about cargo and/or contents, including but not limited to hazardous material and hazardous waste, to assist in the real-time interagency management of a transportation-related incident or event.

Two functions that must be performed to satisfy that mission are as follows:

- F1: Retrieve further information about what the cargo and/or contents is, based on what are often quite partial cues available on site. That information is available in off-site databases (DBs) managed by shippers, carriers, and Fleet and Freight Management centers.
- F2: Retrieve information about the characteristics of the cargo and/or contents that are important for incident management, such as toxicity, flammability, danger of explosion, size of a potential toxic plume, environmental damage, recommended set-back distances, and evacuation areas.

## 4.2 The resulting requirements, at a general level

The functions just specified naturally lead to the following list of requirements the system of messages, data frames, and data elements specified in this volume shall fulfill, in concert with the base standard. These requirements are based on a combination of the experience of members of the IEEE 1512 Working Group and results of several table-top exercises. These requirements fall into three categories:

- a) Messages or sets of messages that describe on-site cues about the cargo and/or contents to a remote cargo/contents database, to retrieve more complete data on that cargo and/or contents. Examples of on-site cues range from statements by the driver to placards to labels on packages to the shipping papers. That database can be very general, such as providing a mapping from package labels to contents types, or very specific, such as might be available from the shipper.
- b) Messages or sets of messages that describe the cargo and/or contents to a remote hazard-management database, to retrieve data on how to manage any cargo/content-related hazards in the course of the management of the incident. The cargo/contents information can range from quite cursory, such as the first on-site cues, to quite complete, such as the complete information from the shipping papers and even more information from the shipper
- c) Messages or sets of messages that contain information available from telematics messages broadcast from the vehicle. Those messages may be broadcast automatically by the vehicle (triggered by on-board cues indicating an incident, including cues indicating leakage), or upon a command action by the driver of the vehicle. In either case, the message can be considered a computer file of information that a local implementation may want to transfer to some or all of the nodes on a IEEE 1512 network; i.e., a network of nodes where each node is in conformance with the IEEE 1512 Family of Standards.

## 4.3 The resulting requirements, at a more specific level

This subclause spells out the three categories of requirements just listed at a higher level of detail, which we call “Functional Requirements” (FR), designed to provide an unambiguous basis for determining that the messages, DFs, and DEs in this companion volume, in Clause 5 and Clause 6, and in the BS satisfy the requirements. Note that the FRs are specified as a continuation of the following sentence:

The messages, DFs, and DEs specified in this companion volume, in concert with the BS, shall provide the capability to communicate the following:

FR1: ... vehicle/cargo information observable from outside the vehicle, or from external observation of cargo containers, but not shipping papers, to an external database for the purpose of

retrieving more detailed information about the cargo. As such, the message constitutes a request for information from the external database.

FR2: ...vehicle/cargo information available from any typical vehicle shipping papers, to an external database for the purpose of retrieving more detailed information about the cargo. As such, the message constitutes a request for information from the external database.

FR3: ...hazmat and other building contents information observable from outside the building, or by observing package units, not records, to an external database for the purpose of retrieving more detailed information about the contents of the building that may be of particular interest for incident management. As such, the message constitutes a request for information from the external database.

FR4: ...hazmat and other building contents information obtainable from records inside the building to an external database for the purpose of retrieving more detailed information about the contents of the building that may be of particular interest for incident management, such as SARA Title III Community Right-to-Know (CR2K) information. As such, the message constitutes a request for information from the external database.

FR5: ...queries from off-site databases about on-site observable data, of the type specified in FR1 through FR4. An off-site cargo database system may want to query on-site personnel about observable data.

FR6: ...responses to queries specified in FR5 about observable data. Information of the type specified in FR1 through FR4 is involved here.

FR7: ...requests for detailed hazmat or non-hazmat cargo information, while providing information of the type specified in FR1 through FR4 or a more detailed level based on a database lookup, as a basis for that. These requests differ from the requests specified in FR1 through FR4, in that they may come from another database rather than on site. That is, on-site data could be communicated to one off-site database for one level of information, via communication specified in FR1 through FR4; then the results of that database lookup could be used to query a more detailed database via communication specified here as FR7. This FR is included to be sure to cover the situation in which the information sequence may start with data available on site (FR1 to FR4), then go to one database to be supplemented, and then go to a second database for further information.

FR8: ...vehicle/cargo or building contents information retrieved from a DB lookup in response to queries based on information of the type specified in FR1 through FR4 and FR7. This information is at a more detailed level than the information carried in FR1 through FR4 and FR7. For example, the querying information might be at the level of types of mixtures, whereas this more detailed information might include actual concentrations.

FR9: ...requests for hazard management information, while providing data of the type specified in FR1 through FR4, FR7, and FR8 as a basis for that. Not keyed to the actual leak/spill situation (for that, see FR11 to FR12).

FR10: ...hazard management information retrieved from a DB lookup in response to queries specified in FR9.

FR11: ...requests for hazard management information specific to the actual situation, while providing data of the type specified in FR1 through FR4, FR7, and FR8 as a basis for that.

FR12: ...hazard management information, for the actual situation of hazardous materials, leaks, spill pool sizes, and potential and actual hazards. That is, the information provided in response to queries specified in FR 11.

FR13: ...requests for current status information of the incident particular to cargo/content.

FR14: ...current status of the incident particular to cargo/content. That is, the information provided in response to queries specified in FR 13.

FR15: ...requests for static document information, such as the 2004 Emergency Response Guide Book.

FR16: ...static document information in response to requests as specified in FR17.

FR17: ...mayday-like (telematic) messages; i.e., telematics messages automatically transmitted from an involved vehicle, or transmitted upon a command action by the driver.

#### 4.4 The resulting requirements, as bases for message sets and data frames

Note that 4.1 through 4.3 progress from 2 functions to 3 requirements to 17 functional requirements. Now that expansive process is reversed, somewhat, as it condenses back down to 10 RITs. The RITs to follow are worded very much like the FRs, except limited to the information type required for each FR. The parts of the FR that extend beyond the RIT can be addressed by the way the message is labeled and defined. For example, FR1 specifies a type of information, repeated below as RIT1, but it is defined as a way to communicate that information to an external database as a request for information based on the contents of the message. That part of the functional requirement is addressed simply by having the message, with its message label, signal that the message constitutes such a request.

In addition to the RITs specified in this subclause, there is a more general requirement that follows from the functional requirements of 4.2: The messages, DFs, and DEs specified in this companion volume, in concert with the Base Standard, shall provide the capability to request and communicate the information specified in the remainder of this subclause, to centers that are capable of receiving and sending the messages from the IEEE 1512 Family of Standards, yet that are not actively on the 1512 network that is managing an incident. An example would be a national shipper associated with a truck involved in an incident. Although that shipper would not be a part of the local network of centers communicating using the IEEE 1512 Family of Standards, it would have information on the cargo of the truck that may not be available anywhere else.

The RITs are specified as a continuation of the following sentence:

The messages, DFs, and DEs specified in this companion volume, in concert with the Base Standard, shall provide the capability to request and communicate ...

RIT1: ... vehicle/cargo information observable from outside the vehicle, or from external observation of cargo containers, but not shipping papers.

Corresponding DFs in Clause 5:

|                     |                       |                             |
|---------------------|-----------------------|-----------------------------|
| DF_ComVehicleHeader | DF_OrangeLabel        | DF_VehicleData              |
| DF_Contents         | DF_PlacardsAndLabels  | MSG_CargoDocs               |
| DF_HazardClass      | DF_PowerUnits         | MSG_CargoUnits              |
| DF_MaterialID       | DF_RadioactivityLabel | MSG_CargoVehicle            |
| DF_NFPA_HMIS        | DF_RailMarkings       | MSG_Placards-Labels-Signage |

RIT2: ... vehicle/cargo information available from any typical vehicle shipping papers.

Corresponding DFs in Clause 5:

|                       |                  |                   |
|-----------------------|------------------|-------------------|
| DF_ConcentrationRange | DF_MaterialID    | DF_ShippingHeader |
| DF_HazardClass        | DF_ShippingEntry |                   |

RIT3: ... building HM and other contents information observable from outside the building, or by observing package units, not records.

Corresponding DFs/MSGs in Clause 5:

DF\_Contents DF\_NFPA\_HMIS MSG\_Placards-Labels-Signage  
DF\_MaterialID MSG\_CargoDocs

RIT4: ... building hazmat information obtainable from records inside the building.

Corresponding DFs in Clause 5:

DF\_HazardClass DF\_MaterialID DF\_ShippingEntry

RIT5: ... vehicle/cargo or building contents information retrieved from a DB lookup in response to queries based on information types RIT1 through RIT4. This information is more detailed than RIT1 through RIT4. For example, the querying information (RIT1–4) might be at the level of types of mixtures, whereas this more detailed information (RIT5) might include actual concentrations.

Corresponding DFs/MSGs in Clause 5:

Any of the DFs/MSGs listed in RIT1 through RIT4, with their contents more completely filled in.

RIT6: ... hazard management information, keyed to the types of materials but not keyed to the actual situation (for that, see RIT7).

Corresponding DFs/MSGs in Clause 5:

Any of the DFs/MSGs listed in RIT1 through RIT5, with their contents more completely filled in.

RIT7: ... hazard management information specific to the actual incident leak/spill situation.

Corresponding DFs/MSGs in Clause 5:

Any of the DFs/MSGs listed in RIT1 through RIT5, with their contents more completely filled in.

DF\_SpillPool MSG\_MaterialRelease

RIT8: ... current status information of the incident particular to cargo/content.

Corresponding DFs/MSGs in Clause 5:

Same as for RIT7

RIT9: ... static document information.

Corresponding DFs/MSGs in Clause 5 (Both are for requesting information. Information may be returned in attached file in Base Standard IDX File Transfer submessage.):

DF\_RequestForInfo MSG\_Im-RFI

RIT10: ... mayday-like (telematic) messages, i.e., telematics messages automatically transmitted from an involved vehicle, or transmitted upon a command action by the driver. This is intended for special telematics messages particular to HM carriers, as opposed to “civilian” telematics.

Corresponding DFs/MSGs in Clause 5:

(Handled as attached files by Base Standard IDX File Transfer submessage.)

## 5. Dialog patterns of the standard

This clause shall be provided at a latter date. It shall contain the formal mappings of messages defined in the subsequent clauses to the dialog exchanges that contain them and the web services description language (WSDL) needed to map them. At this time, no such mappings are formally defined to be part of the published standard.

## 6. Message sets

IM message sets for this volume shall consist of the following message sets. Each shall be further divided into specific messages and elements as defined in this clause and those that follow. Typically, these messages shall be made up of message content internal to this document (made up of entries that are either atomic or complex) and message content external to this document (from other functional areas and companion volumes).

Definitions for these messages are presented in 6.1. One style change in the ASN.1 listing should be noted. In former documents of the IEEE 1512 Family of Standards, it was common to add a comment line stating from where a foreign data element was taken. This has been superceded by the use of module definitions where groups of elements taken from a single standard are all placed in a similar module. For example, in the listing that follows, the concept of date and time is taken from the ATIS work. Citations of these elements have the phrase “ATIS.” before them, as in “ATIS.DateTimePair” in the code. Similar abbreviations are used for TMDD and TCIP. In addition, the ASN is presented in a section called “ASN.1 Representation,” formerly called “Format.” In a similar manner, the equivalent XML expression is presented in a section called “XML Representation” that follows the translation rule set cited in Clause 2.

Regarding equivalent entries to be placed into a data registry: The mapping between data elements and analogous meta-data entries have been explained in Clause 2. In addition, some meta information is constant in this entire standard and need not be repeated with each entry here. These information include the sponsor and steward of the entries [IEEE], the registration status [registered once the standard is adopted], and the revision date [the date of the standards adoption]. The class name is always ITS, and the descriptive name context is Manage Traffic.

The productions of ASN.1 that follows shall be considered normative in nature. Although most of the normative content is reflected in the actual syntax of the ASN.1, some entries also have additional statements in the ASN.1 comments that shall be considered to be normative. In addition, the commentary provided with each entry may also provide additional normative restrictions on the proper use of the entry that shall be followed. The XML productions follow directly from the ASN.1 specifications, and the same rules shall be applied.

### 6.1 Message: MSG\_RequestForExternalInformation

**Use:** Request for Information, used to get data about any index based data base. See the DF\_RequestForInfo entry for additional information on use.

#### ASN.1 Representation:

```
RequestForExternalInformation ::= SEQUENCE {  
    distribute      Distribution OPTIONAL,  
    header          Header,  
    -- if an inner element is not present then  
    -- the header content of the message which
```

```
-- carries this DF shall be applied to the
-- context of this message. The header has the
-- data creator, time stamps, location,
-- and what to do when the message becomes
-- old (how to get a fresh one) and the
-- reference ID of this message or submessage
theRFI      RequestForInfo,
-- a duplicate of the content found in the
-- IDX submessage for RFI
... -- # LOCAL_CONTENT
}
```

#### XML Representation:

```
<xs:element name="requestForExternalInformation" type="RequestForExternalInformation"/>
<xs:complexType name="RequestForExternalInformation" >
  <xs:sequence>
    <xs:element name="distribute" type="Distribution" minOccurs="0"/>
    <xs:element name="header" type="Header" />
    <!-- if an inner element is not present then
    the header content of the message which
    carries this DF shall be applied to the
    context of this message. The header has the
    data creator, time stamps, location,
    and what to do when the message becomes
    old (how to get a fresh one) and the
    reference ID of this message or submessage -->
    <xs:element name="theRFI" type="RequestForInfo" />
    <!-- a duplicate of the content found in the
    IDX submessage for RFI -->
    <xs:element name="localRequestForExternalInformation"
      type="local:RequestForExternalInformation" minOccurs="0"/>
  </xs:sequence>
</xs:complexType>
```

**Used by:** This entry is used directly by one other data structure in this standard, a MSG called MSG\_IM\_Wrapper [IMWrapper] <IMWrapper>. In addition, this item may be used by data structures in other ITS standards.

**Remarks:** Intended for use in getting NAERG type data, or any other sort of database lookup. In practice, this message can be used to look up entries and reply with any sort of data repository that the deployment may wish to use.

## 7. Data frames

IM data frames for this volume shall consist of the following data frames. Each shall be further divided into specific entries and elements as defined in this clause. Typically, these entries shall be made up of content internal to this document (made up of entries that are either atomic or complex) and content external to this document (from other functional areas and companion volumes).

Definitions for these messages are presented in 7.1 through 7.23. One style change in the ASN.1 listing should be noted. In former documents of the IEEE 1512 Family of Standards it was common to add a comment line stating where a foreign data element was taken from. This practice has been superseded by the use of module definitions where groups of elements taken from a single standard are all placed in a similar module. For example, in the listing that follows, the concept of date and time is taken from the ATIS work. Citations of these elements have the phrase “ATIS.” before them, as in “ATIS.DateTimePair” in the code. Similar abbreviations are used for TMDD and TCIP. In addition, the ASN is presented in a section called “ASN.1 Representation,” or formerly called “Format.” In a similar manner, the equivalent XML expression is presented in a section called “XML Representation” that follows the translation rule set cited in Clause 2.

Regarding equivalent entries to be placed into a data registry, the mapping between data elements and analogous meta data entries have been explained in a prior clause. In addition, some meta information is constant in this entire standard and need not be repeated with each entry here. These information include the sponsor and steward of the entries [IEEE], the registration status [registered once the standard is adopted], and the revision date [the date of the standards adoption]. The class name is always ITS, and the descriptive name context is Manage Traffic.

The productions of ASN.1 that follows shall be considered normative in nature. Although most of the normative content is reflected in the actual syntax of the ASN.1, some entries also have additional statements in the ASN.1 comments that shall be considered to be normative. In addition, the commentary provided with each entry may also provide additional normative restrictions on the proper use of the entry that shall be followed. The XML productions follow directly from the ASN.1 specifications, and the same rules shall be applied.

## 7.1 Data frame: DF\_IDX\_CargoDocs

**Use:** A summary of cargo shipping papers and manifest data. Commercial carriers (and some others) are required to carry paperwork describing the nature of the load and highlight hazardous materials. This information can prove to be vital in an incident. Sometimes this information can be obtained from the driver, the shipper, or another source.

This data frame allows a one-to-one capture of that information. A header section allows capture of key data about the shipment, whereas a shipping entry section allows a line-by-line capture of the shipped contents. As with the other messages, the use of arbitrary ID fields allows the CAD to connect relationships among various cargo, vehicles, and data obtained from differing sources.

Note that although this DF is called “Cargo”, it can be used equally well in cases of illegal shipping and incident events not involving a commercial carrier where cargo must still be described. This structure is used in the IDX message of the BS as a new type of submessage.

### ASN.1 Representation:

```
CargoDocs ::= SEQUENCE {
    header          Header,
    -- if an inner element is not present then
    -- the header content of the message which
    -- carries this DF shall be applied to the
    -- context of this message. The header has the
    -- data creator, time stamps, location,
    -- and what to do when the message becomes
    -- old (how to get a fresh one) and the
    -- reference ID of this message or submessage
    packageUnitID   PackageUnitID OPTIONAL,
    -- link to which package unit this
    -- information refers to
    -- this is WITHIN the cargo unit below
    -- and would typically
    -- only be used when this level of detail
    -- was useful to the responder
    handlePack      IA5String(SIZE(1..32)) OPTIONAL,
    -- a human readable / assigned name for the object
    -- (typically assigned by on scene personal, such as "red_box")
    cargoUnitID     CargoUnitID OPTIONAL,
    -- link to which cargo unit this information
    -- refers to this is required on events
    -- involving trains or other multi-cargo
    -- carriers
    handleCargo     IA5String(SIZE(1..32)) OPTIONAL,
    -- a human readable / assigned name for the object
    -- (typically assigned by on scene personal, such as "red_van")
    vehicleUnitID   PowerUnitID OPTIONAL,
```

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```
-- refers to which power unit, used only
-- when there is not separate cargo unit,
-- such as the case of a passenger vehicle
-- or a small truck. In this case there
-- would be no cargoUnitID
handleVec      IA5String(SIZE(1..32)) OPTIONAL,
-- a human readable / assigned name for the object
-- (typically assigned by on scene personal, such as "red_truck")
cargoCondition UnitCondition OPTIONAL,
-- condition of cargo or power unit in general
shippingHeader ShippingHeader,
-- general information, general response number,
shippingEntry  SEQUENCE (SIZE(1..32)) OF ShippingEntry OPTIONAL,
-- sets of entries about the cargo containing data
-- as required by CRF 47/171 for shipments
source         FoundOn OPTIONAL,
-- what was the source of the above information
other          IA5String(SIZE(0..65000)) OPTIONAL,
-- free text information
qual          Reliability,
-- reliability estimate of the above 4 DEs
-- this type is defined in the Base standard
... -- # LOCAL_CONTENT
}
-- observe that it is the cargo or vehicle unit ID that
-- provides the key to connect cargo information to a specific
-- vehicle, trailer, container, etc.and any information on
-- placards and vehicle or container condition
```

**XML Representation:**

```
<xs:complexType name="CargoDocs" >
  <xs:annotation>
    <xs:documentation>
      observe that it is the cargo or vehicle unit ID that
      provides the key to connect cargo information to a specific
      vehicle, trailer, container, etc.and any information on
      placards and vehicle or container condition
    </xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="header" type="Header" />
    <!-- if an inner element is not present then
    the header content of the message which
    carries this DF shall be applied to the
    context of this message. The header has the
    data creator, time stamps, location,
    and what to do when the message becomes
    old (how to get a fresh one) and the
    reference ID of this message or submessage -->
    <xs:element name="packageUnitID" type="PackageUnitID" minOccurs="0"/>
    <!-- link to which package unit this
    information refers to
    this is WITHIN the cargo unit below
    and would typically
    only be used when this level of detail
    was useful to the responder -->
    <xs:element name="handlePack" minOccurs="0">
      <xs:simpleType>
        <xs:restriction base="xs:string">
          <xs:minLength value="1"/>
          <xs:maxLength value="32"/>
        </xs:restriction>
      </xs:simpleType>
    </xs:element>
    <!-- a human readable / assigned name for the object
    (typically assigned by on scene personal, such as "red_box"&quot;) -->
    <xs:element name="cargoUnitID" type="CargoUnitID" minOccurs="0"/>
    <!-- link to which cargo unit this information
```

IEEE Std 1512.3-2006  
IEEE Standard for Hazardous Material Incident Management Message Sets  
for Use by Emergency Management Centers

```
refers to this is required on events
involving trains or other multi-cargo
carriers -->
<xs:element name="handleCargo" minOccurs="0">
  <xs:simpleType>
    <xs:restriction base="xs:string">
      <xs:minLength value="1"/>
      <xs:maxLength value="32"/>
    </xs:restriction>
  </xs:simpleType>
</xs:element>
<!-- a human readable / assigned name for the object
(typically assigned by on scene personal, such as "red_van") -->
<xs:element name="vehicleUnitID" type="PowerUnitID" minOccurs="0"/>
<!-- refers to which power unit, used only
when there is not separate cargo unit,
such as the case of a passenger vehicle
or a small truck. In this case there
would be no cargoUnitID -->
<xs:element name="handleVec" minOccurs="0">
  <xs:simpleType>
    <xs:restriction base="xs:string">
      <xs:minLength value="1"/>
      <xs:maxLength value="32"/>
    </xs:restriction>
  </xs:simpleType>
</xs:element>
<!-- a human readable / assigned name for the object
(typically assigned by on scene personal, such as "red_truck") -->
<xs:element name="cargoCondition" type="UnitCondition" minOccurs="0"/>
<!-- condition of cargo or power unit in general -->
<xs:element name="shippingHeader" type="ShippingHeader" />
<!-- general information, general response number, -->
<xs:element name="shippingEntry" minOccurs="0">
  <xs:complexType>
    <xs:sequence minOccurs="1" maxOccurs="32">
      <xs:element name="shippingEntry-item" type="ShippingEntry" />
      <!-- sets of entries about the cargo containing data as required by CRF
      47/171 for shipments -->
    </xs:sequence>
  </xs:complexType>
</xs:element>
<xs:element name="source" type="FoundOn" minOccurs="0"/>
<!-- what was the source of the above information -->
<xs:element name="other" minOccurs="0">
  <xs:simpleType>
    <xs:restriction base="xs:string">
      <xs:minLength value="0"/>
      <xs:maxLength value="65000"/>
    </xs:restriction>
  </xs:simpleType>
</xs:element>
<!-- free text information -->
<xs:element name="qual" type="Reliability" />
<!-- reliability estimate of the above 4 DEs
this type is defined in the Base standard -->
<xs:element name="localCargoDocs" type="local:CargoDocs" minOccurs="0"/>
</xs:sequence>
</xs:complexType>
```

**Used by:** This entry is used directly by one other data structure in this standard, a DF called DF\_IDX\_Wrapper [IDX-Wrapper] <IDX-Wrapper>. In addition, this item may be used by data structures in other ITS standards.

**Remarks:** Contents and markings as per federal codes with various contact numbers.

## 7.2 Data frame: DF\_IDX\_CargoUnits

**Use:** Data about the type of cargo units carried and their condition. Note that the “contains” structure allows for a complex description of the contents. This structure is used in the IDX message of the BS as a new type of submessage and as part of the Cargo Vehicle message.

### ASN.1 Representation:

```
CargoUnits ::= SEQUENCE {
    header          Header,
    -- if an inner element is not present then
    -- the header content of the message which
    -- carries this DF shall be applied to the
    -- context of this message. The header has the
    -- data creator, time stamps, location,
    -- and what to do when the message becomes
    -- old (how to get a fresh one) and the
    -- reference ID of this message or submessage
    id              CargoUnitID,
    -- the reference number for this unit / object
    -- (typically assigned by the CAD, such as "123:ase:321")
    handle          IA5String(SIZE(1..32)) OPTIONAL,
    -- a human readable / assigned name for the object
    -- (typically assigned by on scene personal, such as "red_truck")
    condition       SEQUENCE (SIZE(1..32)) OF UnitCondition,
    -- the overall condition of this cargo unit
    conditionText   IA5String(SIZE(0..255)) OPTIONAL,
    -- any free text condition of this cargo unit
    axleCount       AxleCount OPTIONAL,
    -- add weight and other factors
    protectionUsed  OccupantProtectionSystemUsed OPTIONAL,
    airBagUse       AirBagDeployed OPTIONAL,
    uderrideCode    UnderrideOverrideCode OPTIONAL,
    cargoUnitType   SEQUENCE (SIZE(1..32)) OF CargoPackageType OPTIONAL,
    -- a list of common cargo types, includes
    -- one for free text
    -- which follows below (e.g. Trailer, MC307,
    -- Hopper-Car, etc.)
    -- observe that a single cargo unit may have
    -- more than one type associated with it
    cargoUnitText   IA5String(SIZE(0..20)) OPTIONAL,
    -- text describing the type of cargo unit
    -- when the above types do not fit
    contains        SEQUENCE (SIZE(1..32)) OF Contents OPTIONAL,
    -- information on any specific packages
    -- and cargo found here
    -- includes proper shipping name, hazmat
    -- labels, and location within unit
    towingIssues    IA5String(SIZE(0..255)) OPTIONAL,
    -- any special issues with recovery or towing to be
    -- aware of would be placed here.
    qual            Reliability,
    -- reliability estimate of the above 4 DEs
    -- this type is defined in the Base standard
    ... -- # LOCAL_CONTENT
}
-- see the CommercialVehicle submessage (which this
-- structure is used in) for information about commercial
-- registration values see the Cargo submessage for
-- information about contents
```

### XML Representation:

```
<xs:complexType name="CargoUnits" >
  <xs:annotation>
    <xs:documentation>
      see the CommercialVehicle submessage (which this
      structure is used in) for information about commercial
```

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```
        registration values see the Cargo submessage for
        information about contents
    </xs:documentation>
</xs:annotation>
<xs:sequence>
    <xs:element name="header" type="Header" />
    <!-- if an inner element is not present then
    the header content of the message which
    carries this DF shall be applied to the
    context of this message. The header has the
    data creator, time stamps, location,
    and what to do when the message becomes
    old (how to get a fresh one) and the
    reference ID of this message or submessage -->
    <xs:element name="id" type="CargoUnitID" />
    <!-- the reference number for this unit / object
    (typically assigned by the CAD, such as &quot;123:ase:321&quot;); -->
    <xs:element name="handle" minOccurs="0">
        <xs:simpleType>
            <xs:restriction base="xs:string">
                <xs:minLength value="1"/>
                <xs:maxLength value="32"/>
            </xs:restriction>
        </xs:simpleType>
    </xs:element>
    <!-- a human readable / assigned name for the object
    (typically assigned by on scene personal, such as &quot;red_truck&quot;); -->
    <xs:element name="condition" >
        <xs:complexType>
            <xs:sequence minOccurs="1" maxOccurs="32">
                <xs:element name="condition-item" type="UnitCondition" />
                <!-- the overall condition of this cargo unit -->
            </xs:sequence>
        </xs:complexType>
    </xs:element>
    <xs:element name="conditionText" minOccurs="0">
        <xs:simpleType>
            <xs:restriction base="xs:string">
                <xs:minLength value="0"/>
                <xs:maxLength value="255"/>
            </xs:restriction>
        </xs:simpleType>
    </xs:element>
    <!-- any free text condition of this cargo unit -->
    <xs:element name="axleCount" type="AxleCount" minOccurs="0"/>
    <!-- add weight and other factors -->
    <xs:element name="protectionUsed" type="OccupantProtectionSystemUsed"
        minOccurs="0"/>
    <xs:element name="airBagUse" type="AirBagDeployed" minOccurs="0"/>
    <xs:element name="overrideCode" type="OverrideOverrideCode" minOccurs="0"/>
    <xs:element name="cargoUnitType" minOccurs="0">
        <xs:complexType>
            <xs:sequence minOccurs="1" maxOccurs="32">
                <xs:element name="cargoUnitType-item" type="CargoPackageType" />
                <!-- a list of common cargo types, includes one for free text which
                follows below (e.g. Trailer, MC307, Hopper-Car, etc.) observe
                that a single cargo unit may have more than one type associated
                with it -->
            </xs:sequence>
        </xs:complexType>
    </xs:element>
    <xs:element name="cargoUnitText" minOccurs="0">
        <xs:simpleType>
            <xs:restriction base="xs:string">
                <xs:minLength value="0"/>
                <xs:maxLength value="20"/>
            </xs:restriction>
        </xs:simpleType>
    </xs:element>
</xs:sequence>
```

```

</xs:element>
<!-- text describing the type of cargo unit
when the above types do not fit -->
<xs:element name="contains" minOccurs="0">
  <xs:complexType>
    <xs:sequence minOccurs="1" maxOccurs="32">
      <xs:element name="contain" type="Contents" />
      <!-- information on any specific packages and cargo found here includes
proper shipping name, hazmat labels, and location within unit -->
    </xs:sequence>
  </xs:complexType>
</xs:element>
<xs:element name="towingIssues" minOccurs="0">
  <xs:simpleType>
    <xs:restriction base="xs:string">
      <xs:minLength value="0"/>
      <xs:maxLength value="255"/>
    </xs:restriction>
  </xs:simpleType>
</xs:element>
<!-- any special issues with recovery or towing to be
aware of would be placed here. -->
<xs:element name="qual" type="Reliability" />
<!-- reliability estimate of the above 4 DEs
this type is defined in the Base standard -->
<xs:element name="localCargoUnits" type="local:CargoUnits" minOccurs="0"/>
</xs:sequence>
</xs:complexType>

```

**Used by:** This entry is directly used by the following two other data structures in this standard [record type, descriptive name, ASN.1, and XML name (if present) of each]:

|    |                                     |                                                               |
|----|-------------------------------------|---------------------------------------------------------------|
| DF | <a href="#">DF_IDX_CargoVehicle</a> | <a href="#">&lt;ASN&gt;</a> <a href="#">&lt;XML&gt;</a> , and |
| DF | DF_IDX_Wrapper                      | [IDX-Wrapper]                                                 |
|    | <IDX-Wrapper>.                      |                                                               |

In addition, this item may be used by data structures in other ITS standards.

**Remarks:** There is also another message dealing with the contents and shipping papers.

## 7.3 Data frame: DF\_IDX\_CargoVehicle

**Use:** Descriptions of a cargo-carrying vehicle and/or cargo container. This information may be used for commercial purposes, private, or illegal, in fact, any type of vehicle. The header section allows an overall characterization of the vehicle. The registration area allows the capture of many commercial registration data elements. The “power units” allows capture of one or more power units. Typically, a roadway vehicle will have one (or perhaps none in the case of a trailer abandonment) power units, whereas a train or barge may have several. In a similar fashion, there may be none, one, or more cargo units (each with cargo contents inside). It is typically not vital to fill out this data structure to the *N*th degree of cargo package detail unless this is pertinent to the response of the incident. For example, the towing free text section (which allows the description of any unique requirements or plan that is to be followed) would also be left blank unless some unusual event called for providing data. In practice, it is expected that only the important top-level data will be provided and the message would be updated (using the update methods of the BS) with further data as conditions warranted. This structure is used in the IDX message of the BS as a new type of submessage.

### ASN.1 Representation:

```

CargoVehicle ::= SEQUENCE {
    header          Header,
    -- if an inner element is not present then
    -- the header content of the message which

```

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```

-- carries this DF shall be applied to the
-- context of this message. The header has the
-- data creator, time stamps, location,
-- and what to do when the message becomes
-- old (how to get a fresh one) and the
-- reference ID of this message or submessage
summary      ComVehicleHeader OPTIONAL,
-- various key codes about the gross type and
-- condition of the vehicle and cargo and the
-- presence of placard or warning data
-- (details in another message)
registration SEQUENCE (SIZE(1..32)) OF ComReg OPTIONAL,
-- data concerning the commercial
-- registration values, note that this duplicates data found
-- in the powerunits below. It need not be sent twice.
powerUnits   SEQUENCE (SIZE(1..32)) OF PowerUnits OPTIONAL,
-- data about the truck, train or other power
-- unit single vehicles (cargo components
-- attached) are here as well as illegal
-- vehicles found to be hauling
cargoUnits   SEQUENCE (SIZE(1..32)) OF CargoUnits OPTIONAL,
-- data about the cargo units (trailers,
-- containers etc...) contents and shipping
-- papers can be found in another message
refToPlacards IA5String(SIZE(0..15)) OPTIONAL,
-- a unique code to link to any IDX
-- submessage with placard
-- or warning data for this vehicle
other        IA5String(SIZE(0..1000)) OPTIONAL,
-- free text information
towing       IA5String(SIZE(0..1000)) OPTIONAL,
-- any further data on tow points or recovery process
qual         Reliability,
-- reliability estimate of the above 4 DEs
-- this type is defined in the Base standard
... -- # LOCAL_CONTENT
}

```

### XML Representation:

```

<xs:complexType name="CargoVehicle" >
  <xs:sequence>
    <xs:element name="header" type="Header" />
    <!-- if an inner element is not present then
    the header content of the message which
    carries this DF shall be applied to the
    context of this message. The header has the
    data creator, time stamps, location,
    and what to do when the message becomes
    old (how to get a fresh one) and the
    reference ID of this message or submessage -->
    <xs:element name="summary" type="ComVehicleHeader" minOccurs="0"/>
    <!-- various key codes about the gross type and
    condition of the vehicle and cargo and the
    presence of placard or warning data
    (details in another message) -->
    <xs:element name="registration" minOccurs="0">
      <xs:complexType>
        <xs:sequence minOccurs="1" maxOccurs="32">
          <xs:element name="registration-item" type="ComReg" />
          <!-- data concerning the commercial registration values, note that
          this duplicates data found in the powerunits below. It need not be
          sent twice. -->
        </xs:sequence>
      </xs:complexType>
    </xs:element>
    <xs:element name="powerUnits" minOccurs="0">
      <xs:complexType>
        <xs:sequence minOccurs="1" maxOccurs="32">

```