



CANUTEC

2008 Emergency Response Guidebook



A GUIDEBOOK
FOR FIRST RESPONDERS
DURING THE INITIAL PHASE
OF A DANGEROUS GOODS/
HAZARDOUS MATERIALS
TRANSPORTATION INCIDENT



ERG2008

- The *Emergency Response Guidebook 2008* (*ERG2008*) 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.



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➤ ERG2008 Sections:

- 1) Telephone numbers (page 8)
- 2) Table of placards (pages 16-17)
- 3) Railcar and Road Trailer ID Charts (pages 18-19)
- 4) **YELLOW** Section (ID No.)
- 5) **BLUE** Section (Shipping Names)
- 6) **ORANGE** Section (Guide Pages)
- 7) **GREEN** Section (Initial Isolation and Protective Action Distances for highlighted substances)



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- Other ERG2008 Sections, not covered in the presentation, but suggested for reading:
 - Shipping Documents (inside front page cover)
 - Hazard Zones for TIH Substances (page 4)
 - Safety Precautions (page 6)
 - Hazard Classification System (page 14)
 - Hazard Identification Codes Displayed on Some Intermodal Containers (pages 20 to 23)
 - Pipeline Transportation (pages 24-25)



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- Other ERG2008 Sections...(continued):
 - Protective Clothing (pages 348-349)
 - Fire and Spill Control (pages 350-351)
 - Criminal / Terrorist Use of Chemical / Biological / Radiological Agents (pages 352 to 355)
 - Glossary (pages 356 to 364)
 - Emergency Response Telephone Numbers (pages 372-373)



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1) Telephone Numbers

- Dial the emergency telephone number listed on the shipping document* OR contact the appropriate emergency response agency as soon as possible (numbers are listed on the inside back cover of the ERG) to obtain more detailed information on the substance involved, the safety precautions and risk mitigation procedures.

** In Canada, this number could be CANUTEC's telephone number*



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1) Telephone Numbers (continued)

- Page 8 provides the telephone numbers of the provincial agencies that **must** be contacted* for any incident involving dangerous goods.

** Canadian Federal and Provincial Regulations requirements*

- Additionally, CANUTEC* **may** be contacted in order to get more detailed technical information on the dangerous goods involved.

** Even if CANUTEC's telephone number is not shown on the shipping document*



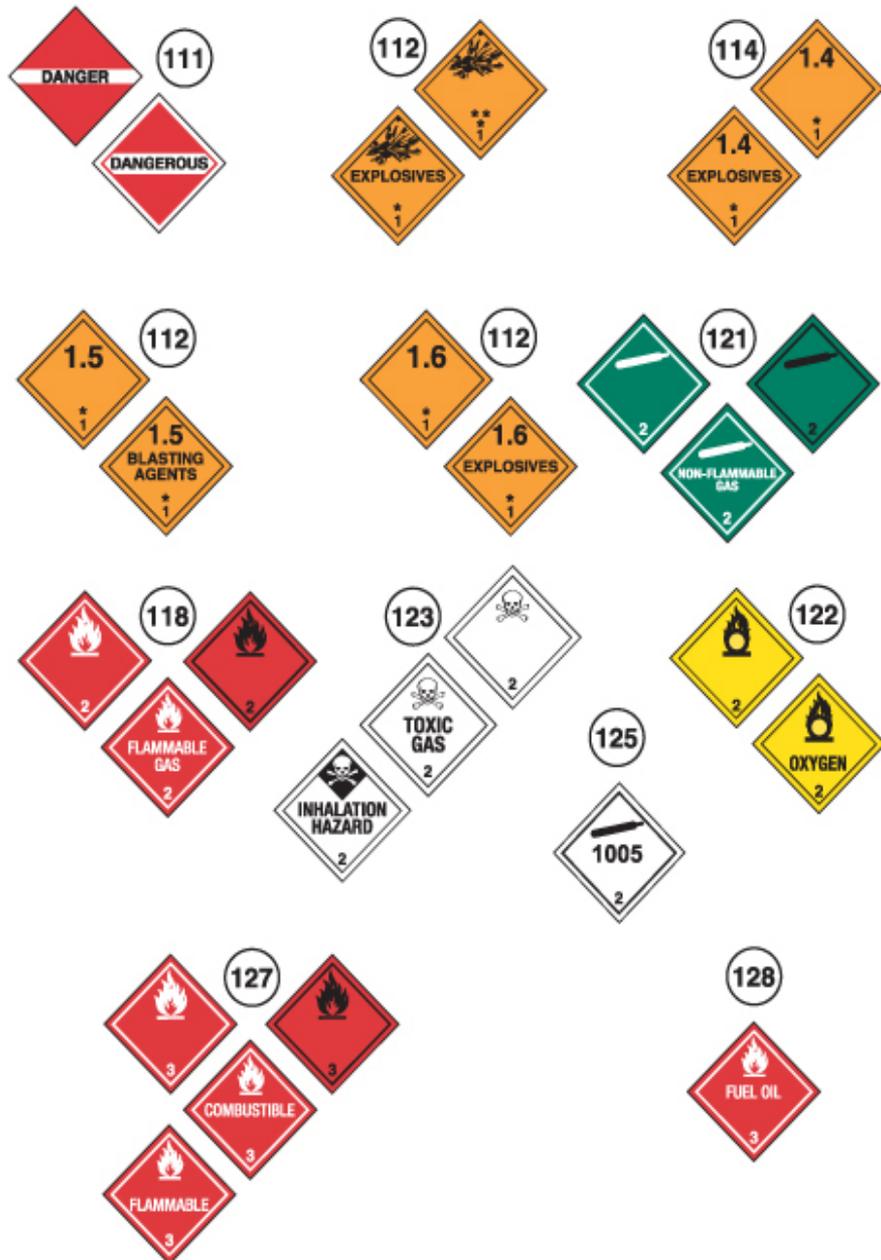
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2) Table of Placards

- Pages 16 and 17 of the ERG depict the different placards used in the transport of dangerous goods.
- Each group of placards is associated to a 3-digit guide number (**ORANGE** Section).
- Caution: The recommended guides should be considered as a last resort if the material cannot be identified by any other means.

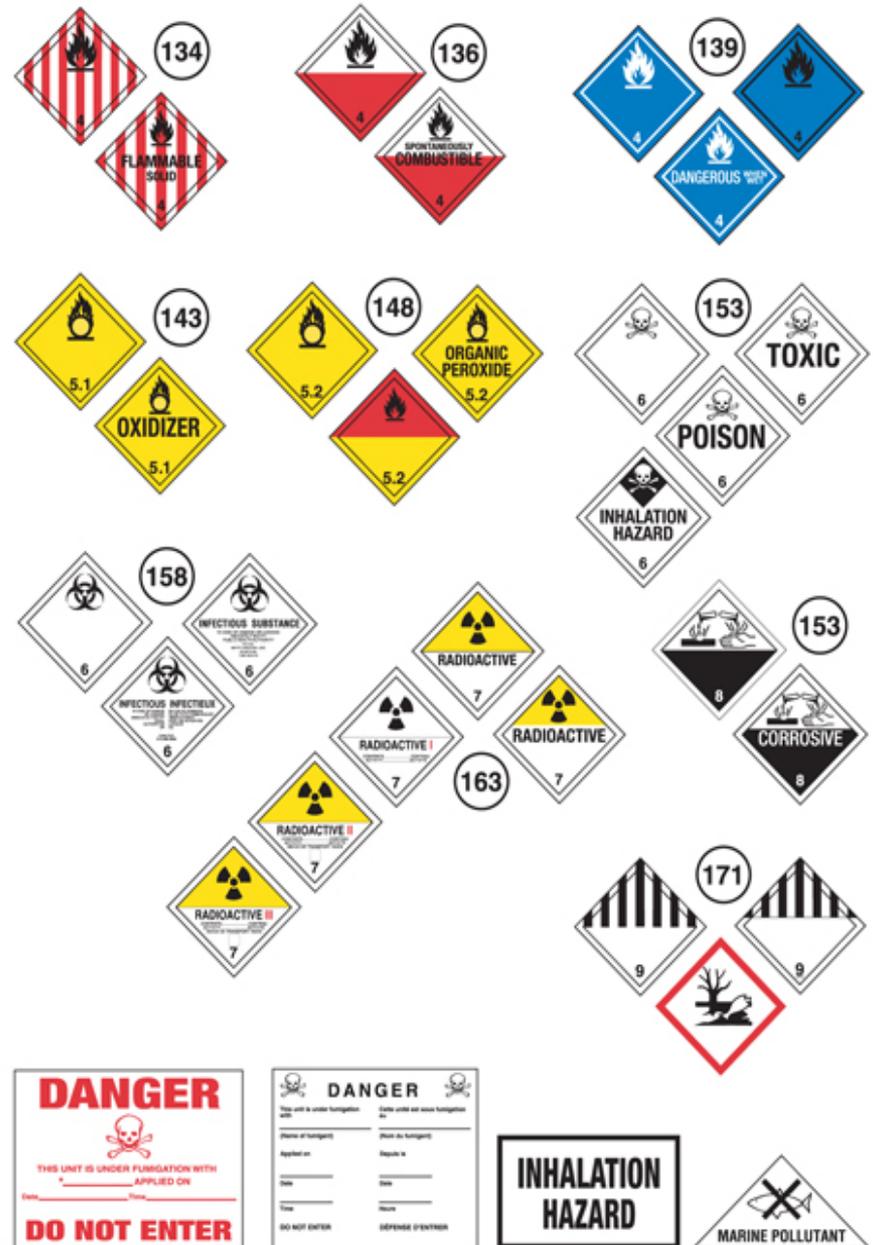
TABLE OF PLACARDS AND INITIAL

USE THIS TABLE ONLY IF MATERIALS CANNOT BE SPECIFICALLY IDENTIFIED BY



RESPONSE GUIDE TO USE ON-SCENE

USING THE SHIPPING DOCUMENT, NUMBERED PLACARD, OR ORANGE PANEL NUMBER





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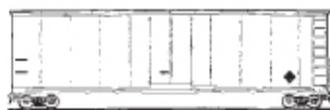
3) Rail Car and Road Trailer ID Charts

- Pages 18 and 19 depict the general shapes of railcars and road trailers used in the transportation of dangerous goods.
- Each shape is associated to a 3-digit guide number (**ORANGE** Section).
- Caution: The recommended guides should be considered as a last resort if the material cannot be identified by any other means.

RAIL CAR IDENTIFICATION CHART*



Hopper Car
Dry Bulk (140)



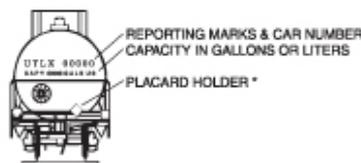
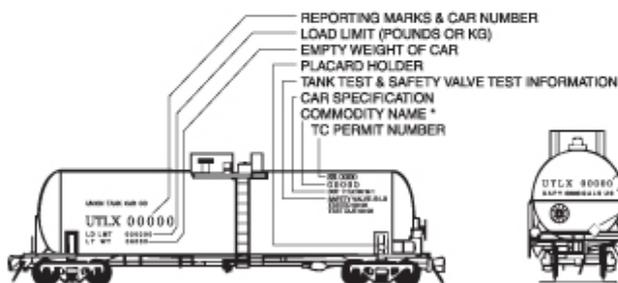
Box Car
Mixed Cargo (111)



Pressure Tank Car
Compressed Liquefied Gases (117)



Low Pressure Tank Car
Liquids (131)



CAUTION: Emergency response personnel must be aware that rail tank cars vary widely in construction, fittings and purpose. Tank cars could transport products that may be solids, liquids or gases. The products may be under pressure. It is essential that products be identified by consulting shipping documents or train consist or contacting dispatch centers before emergency response is initiated.

The information stenciled on the sides or ends of tank cars, as illustrated above, may be used to identify the product utilizing:

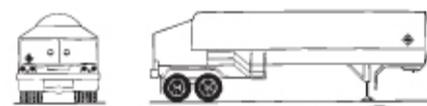
- the commodity name shown; or
- the other information shown, especially reporting marks and car number which, when supplied to a dispatch center, will facilitate the identification of the product.

* The recommended guides should be considered as last resort if the material cannot be identified by any other means.

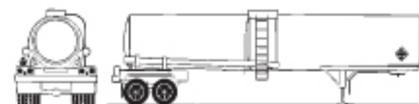
ROAD TRAILER IDENTIFICATION CHART*



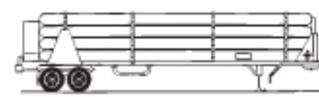
DOT406, TC406, SCT-306
Non-pressure Liquid Tank
(MC306, TC306) (131)



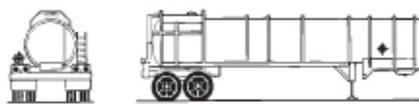
MC338, TC338, SCT-338
Cryogenic Liquid Tank
(TC341, CGA341) (117)



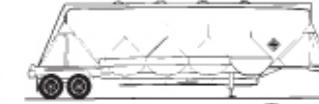
DOT407, TC407, SCT-307
Low Pressure Chemical Tank
(MC307, TC307) (137)



Compressed Gas/
Tube Trailer (117)



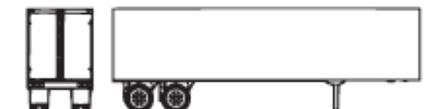
DOT412, TC412, SCT-312
Corrosive Liquid Tank
(MC312, TC312) (137)



Dry Bulk Cargo
Trailer (134)



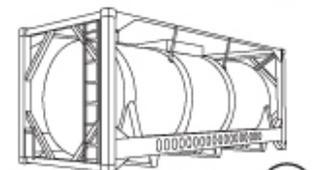
MC331, TC331, SCT-331
High Pressure Tank (117)



Mixed Cargo (111)



DOT407, TC407, DOT412, TC412
Vacuum Loaded Tank
(TC350) (137)



Intermodal Tank (117)

CAUTION: This chart depicts only the most general shapes of road trailers. Emergency response personnel must be aware that there are many variations of road trailers, not illustrated above, that are used for shipping chemical products. The suggested guides are for the most hazardous products that may be transported in these trailer types.

* The recommended guides should be considered as last resort if the material cannot be identified by any other means.



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4) The **YELLOW** Section

- In this section, the substances are listed in numerical order of their 4-digit ID Numbers.
- The ID Number is followed by the 3-digit **ORANGE** guide number to refer to, as well as the product name.
- Please note that some substances are highlighted in **GREEN** and should be treated specifically.

ID No.	Guide No.	Name of Material	ID No.	Guide No.	Name of Material	ID No.	Guide No.	Name of Material	ID No.	Guide No.	Name of Material
1030	115	1,1-Difluoroethane	1046	121	Helium	1063	115	Refrigerant gas R-40	1077	115	Propylene
1030	115	Difluoroethane	1046	121	Helium, compressed	1064	117	Methyl mercaptan	1078	126	Dispersant gas, n.o.s.
1030	115	Refrigerant gas R-152a	1048	125	Hydrogen bromide, anhydrous	1065	121	Neon	1078	126	Refrigerant gas, n.o.s.
1032	118	Dimethylamine, anhydrous	1049	115	Hydrogen	1065	121	Neon, compressed	1079	125	Sulfur dioxide
1033	115	Dimethyl ether	1049	115	Hydrogen, compressed	1066	121	Nitrogen	1079	125	Sulphur dioxide
1035	115	Ethane	1050	125	Hydrogen chloride, anhydrous	1066	121	Nitrogen, compressed	1080	126	Sulfur hexafluoride
1035	115	Ethane, compressed	1051	117	AC	1067	124	Dinitrogen tetroxide	1080	126	Sulphur hexafluoride
1036	118	Ethylamine	1051	117	Hydrocyanic acid, aqueous solutions, with more than 20% Hydrogen cyanide	1067	124	Nitrogen dioxide	1081	116P	Tetrafluoroethylene, stabilized
1037	115	Ethyl chloride	1051	117	Hydrogen cyanide, anhydrous, stabilized	1069	125	Nitrosyl chloride	1082	119P	Trifluorochloroethylene, stabilized
1038	115	Ethylene, refrigerated liquid (cryogenic liquid)	1051	117	Hydrogen cyanide, stabilized	1070	122	Nitrous oxide	1083	118	Trimethylamine, anhydrous
1039	115	Ethyl methyl ether	1051	117	Hydrogen cyanide, stabilized	1070	122	Nitrous oxide, compressed	1085	116P	Vinyl bromide, stabilized
1039	115	Methyl ethyl ether	1052	125	Hydrogen fluoride, anhydrous	1071	119	Oil gas	1086	116P	Vinyl chloride, stabilized
1040	119P	Ethylene oxide	1053	117	Hydrogen sulfide	1071	119	Oil gas, compressed	1087	116P	Vinyl methyl ether, stabilized
1040	119P	Ethylene oxide with Nitrogen	1053	117	Hydrogen sulphide	1072	122	Oxygen	1088	127	Acetal
1041	115	Carbon dioxide and Ethylene oxide mixture, with more than 9% but not more than 87% Ethylene oxide	1055	115	Isobutylene	1072	122	Oxygen, compressed	1089	129	Acetaldehyde
1041	115	Carbon dioxide and Ethylene oxide mixtures, with more than 6% Ethylene oxide	1056	121	Krypton	1073	122	Oxygen, refrigerated liquid (cryogenic liquid)	1090	127	Acetone
1041	115	Ethylene oxide and Carbon dioxide mixture, with more than 9% but not more than 87% Ethylene oxide	1056	121	Krypton, compressed	1075	115	Butane	1091	127	Acetone oils
1041	115	Ethylene oxide and Carbon dioxide mixtures, with more than 6% Ethylene oxide	1057	115	Lighter refills (cigarettes) (flammable gas)	1075	115	Butane mixture	1092	131P	Acrolein, stabilized
1043	125	Fertilizer, ammoniating solution, with free Ammonia	1057	115	Lighters (cigarettes) (flammable gas)	1075	115	Butylene	1093	131P	Acrylonitrile, stabilized
1044	126	Fire extinguishers with compressed gas	1058	120	Liquefied gases, non-flammable, charged with Nitrogen, Carbon dioxide or Air	1075	115	Isobutane	1098	131	Allyl alcohol
1044	126	Fire extinguishers with liquefied gas	1060	116P	Methylacetylene and Propadiene mixture, stabilized	1075	115	Isobutane mixture	1099	131	Allyl bromide
1045	124	Fluorine	1060	116P	Propadiene and Methylacetylene mixture, stabilized	1075	115	Isobutylene	1100	131	Allyl chloride
1045	124	Fluorine, compressed	1061	118	Methylamine, anhydrous	1075	115	Liquefied petroleum gas	1104	129	Amyl acetates
			1062	123	Methyl bromide	1075	115	LPG	1105	129	Amyl alcohols
			1063	115	Methyl chloride	1075	115	Petroleum gases, liquefied	1105	129	Pentanol
						1075	115	Propane	1106	132	Amylamines
						1075	115	Propane mixture	1107	129	Amyl chloride
						1075	115	Propylene	1108	128	n-Amylene
						1076	125	CG	1108	128	1-Pentene
						1076	125	Diphosgene	1109	129	Amyl formates
						1076	125	DP	1110	127	n-Amyl methyl ketone
						1076	125	Phosgene	1110	127	Amyl methyl ketone



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5) The **BLUE** Section

- In this section, the substances are listed in alphabetical order of their shipping names.
- The name of the substance is followed by the 3-digit **ORANGE** guide number to refer to, as well as the ID Number.
- Please note that some substances are highlighted in **GREEN** and thus will have to be treated specifically.

Name of Material	Guide ID No.	Guide ID No.	Name of Material	Guide ID No.	Guide ID No.	Name of Material	Guide ID No.	Guide ID No.	Name of Material	Guide ID No.	Guide ID No.
Bisulfates, aqueous solution	154	2837	Boron trifluoride propionic acid complex, solid	157	3420	2-Bromopentane	130	2343	Butyl ethers	128	1149
Bisulfites, aqueous solution, n.o.s.	154	2693	Bromates, inorganic, aqueous solution, n.o.s.	140	3213	2-Bromopropane	129	2344	n-Butyl formate	129	1128
Bisulfites, inorganic, aqueous solution, n.o.s.	154	2693	Bromates, inorganic, n.o.s.	141	1450	Bromopropanes	129	2344	tert-Butyl hypochlorite	135	3255
Bisulphates, aqueous solution	154	2837	Bromine	154	1744	3-Bromopropyne	130	2345	N,n-Butylimidazole	152	2690
Bisulphites, aqueous solution, n.o.s.	154	2693	Bromine, solution	154	1744	Bromotrifluoroethylene	116	2419	n-Butyl isocyanate	155	2485
Bisulphites, inorganic, aqueous solution, n.o.s.	154	2693	Bromine, solution (Inhalation Hazard Zone A)	154	1744	Bromotrifluoromethane	126	1009	tert-Butyl isocyanate	155	2484
Blasting agent, n.o.s.	112	—	Bromine, solution (Inhalation Hazard Zone B)	154	1744	Brown asbestos	171	2212	Butyl mercaptan	130	2347
Bleaching powder	140	2208	Bromine chloride	124	2901	Brucine	152	1570	n-Butyl methacrylate, stabilized	130P	2227
Blue asbestos	171	2212	Bromine pentafluoride	144	1745	Butadienes, stabilized	116P	1010	Butyl methyl ether	127	2350
Bombs, smoke, non-explosive, with corrosive liquid, without initiating device	153	2028	Bromine trifluoride	144	1746	Butadienes and hydrocarbon mixture, stabilized	116P	1010	Butyl nitrites	129	2351
Borate and Chlorate mixtures	140	1458	Bromoacetic acid	156	1938	Butane	115	1011	Butyl propionates	130	1914
Borneol	133	1312	Bromoacetic acid, solid	156	3425	Butane	115	1075	Butyltoluenes	152	2667
Boron tribromide	157	2692	Bromoacetic acid, solution	156	1938	Butanedione	127	2346	Butyltrichlorosilane	155	1747
Boron trichloride	125	1741	Bromoacetone	131	1569	Butane mixture	115	1011	5-tert-Butyl-2,4,6-trinitro-m-xylene	149	2956
Boron trifluoride	125	1008	Bromoacetyl bromide	156	2513	Butane mixture	115	1075	Butyl vinyl ether, stabilized	127P	2352
Boron trifluoride, compressed	125	1008	Bromobenzene	130	2514	Butanols	129	1120	1,4-Butynediol	153	2716
Boron trifluoride, dihydrate	157	2851	Bromobenzyl cyanides	159	1694	Butoxyl	127	2708	Butyraldehyde	129	1129
Boron trifluoride acetic acid complex	157	1742	Bromobenzyl cyanides, liquid	159	1694	Butyl acetates	129	1123	Butyraldoxime	129	2840
Boron trifluoride acetic acid complex, liquid	157	1742	Bromobenzyl cyanides, solid	159	1694	Butyl acid phosphate	153	1718	Butyric acid	153	2820
Boron trifluoride acetic acid complex, solid	157	3419	1-Bromobutane	130	1126	Butyl acrylates, stabilized	129P	2348	Butyric anhydride	156	2739
Boron trifluoride diethyl etherate	132	2604	2-Bromobutane	130	2339	n-Butylamine	132	1125	Butyronitrile	131	2411
Boron trifluoride dimethyl etherate	139	2965	Bromochlorodifluoromethane	126	1974	N-Butylaniline	153	2738	Butyryl chloride	132	2353
Boron trifluoride propionic acid complex	157	1743	Bromochloromethane	160	1887	Butylbenzenes	128	2709	Buzz	153	2810
Boron trifluoride propionic acid complex, liquid	157	1743	1-Bromo-3-chloropropane	159	2688	n-Butyl bromide	130	1126	BZ	153	2810
			2-Bromoethyl ethyl ether	130	2340	Butyl chloride	130	1127	CA	159	1694
			Bromoform	159	2515	n-Butyl chloroformate	155	2743	Cacodylic acid	151	1572
			1-Bromo-3-methylbutane	130	2341	sec-Butyl chloroformate	155	2742	Cadmium compound	154	2570
			Bromomethylpropanes	130	2342	tert-Butylcyclohexyl chloroformate	156	2747	Caesium	138	1407
			2-Bromo-2-nitropropane-1,3-diol	133	3241	Butylene	115	1012	Caesium hydroxide	157	2682
						Butylene	115	1075	Caesium hydroxide, solution	154	2681
						1,2-Butylene oxide, stabilized	127P	3022	Caesium nitrate	140	1451
									Calcium	138	1401



Letter “P”

Note regarding the **YELLOW** and **BLUE** bordered Sections

- If the 3-digit guide number is supplemented with the letter “P”, it indicates that the material may undergo explosive polymerization if subjected to heat or contamination.
- **Polymerization generates heat and pressure build-up inside containers, which may explode.**



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6) The **ORANGE** Section (Guides)

- This section contains all the guides needed for the initial response phase of an incident involving dangerous goods.



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6) The **ORANGE** Section (Guides) contains:



* The section *Fire or Explosion* or *Health* will appear first depending on the primary hazards of the type of substance.

POTENTIAL HAZARDS

FIRE OR EXPLOSION

- **HIGHLY FLAMMABLE:** Will be easily ignited by heat, sparks or flames.
- Vapors may form explosive mixtures with air.
- Vapors may travel to source of ignition and flash back.
- Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks).
- Vapor explosion hazard indoors, outdoors or in sewers.
- Those substances designated with a "P" may polymerize explosively when heated or involved in a fire.
- Runoff to sewer may create fire or explosion hazard.
- Containers may explode when heated.
- Many liquids are lighter than water.
- Substance may be transported hot.
- **If molten aluminum is involved, refer to GUIDE 169.**

HEALTH

- Inhalation or contact with material may irritate or burn skin and eyes.
- Fire may produce irritating, corrosive and/or toxic gases.
- Vapors may cause dizziness or suffocation.
- Runoff from fire control or dilution water may cause pollution.

PUBLIC SAFETY

- **CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.**
- As an immediate precautionary measure, isolate spill or leak area for at least 50 meters (150 feet) in all directions.
- Keep unauthorized personnel away.
- Stay upwind.
- Keep out of low areas.
- Ventilate closed spaces before entering.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Structural firefighters' protective clothing will only provide limited protection.

EVACUATION

Large Spill

- Consider initial downwind evacuation for at least 300 meters (1000 feet).

Fire

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

FIRE

CAUTION: All these products have a very low flash point: Use of water spray when fighting fire may be inefficient.

CAUTION: For mixtures containing alcohol or polar solvent, alcohol-resistant foam may be more effective.

Small Fire

- Dry chemical, CO₂, water spray or regular foam.

Large Fire

- Water spray, fog or regular foam.
- Use water spray or fog; do not use straight streams.
- Move containers from fire area if you can do it without risk.

Fire Involving Tanks or Car/Trailer Loads

- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Cool containers with flooding quantities of water until well after fire is out.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- ALWAYS stay away from tanks engulfed in fire.
- For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

SPILL OR LEAK

- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- All equipment used when handling the product must be grounded.
- Do not touch or walk through spilled material. • Stop leak if you can do it without risk.
- Prevent entry into waterways, sewers, basements or confined areas.
- A vapor suppressing foam may be used to reduce vapors.
- Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. • Use clean non-sparking tools to collect absorbed material.

Large Spill

- Dike far ahead of liquid spill for later disposal.
- Water spray may reduce vapor; but may not prevent ignition in closed spaces.

FIRST AID

- Move victim to fresh air. • Call 911 or emergency medical service.
- Give artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- Wash skin with soap and water.
- In case of burns, immediately cool affected skin for as long as possible with cold water. Do not remove clothing if adhering to skin. • Keep victim warm and quiet.
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.



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6) The **ORANGE** Section (Guides) contains:

➤ Under *Public Safety*:

- A suggested isolation area, as an immediate precautionary measure, irrespectively of the quantity involved.

➤ Under *Evacuation*:

- A suggested evacuation perimeter for spill and fire situations AND/OR
- The reference to Table 1 - Initial Isolation and Protective Action Distances (**GREEN** Section).



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In the **YELLOW** or **BLUE** Sections, if the substance is not highlighted:

- Use the suggested distances provided in the **ORANGE** Section, i.e.:
 - Isolate the area in all directions, as an immediate precautionary measure, to the minimum distance suggested under *Public Safety*, and increase the zone if needed;
 - Consider the evacuation distances suggested under *Evacuation – Spill / Fire*.



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In the **YELLOW** or **BLUE** Sections, if the substance is highlighted in **GREEN**:

- For small and large spills use the Initial Isolation and Protective Action Distances suggested in the **GREEN** Section (Table 1).
- In case of fire, use the distances provided in the **ORANGE** Guide, under *Evacuation – Fire*.



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Notes regarding the **ORANGE** Guides and the highlighted / non-highlighted substances

- Each Guide covers a *range* of products, which present similar hazards;
- Some specific substances (highlighted in the **YELLOW** and **BLUE**-bordered pages) must be dealt using simultaneously the **ORANGE** and **GREEN** Sections;
- The **GREEN** Section indicates the specific distances to be used for each product;



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- 36 **ORANGE** Guides refer only to non-highlighted substances (non-TIH);
- 21 **ORANGE** Guides refer to both highlighted and non-highlighted substances (TIH and non-TIH);
- 5 **ORANGE** Guides refer only to highlighted substances (TIH).

It is then very important to verify if the substance found in the **YELLOW** or **BLUE**-bordered pages is highlighted or not in **GREEN**, in order to use the relevant distances from the **ORANGE** and/or **GREEN** Sections, according to the indications provided in the **ORANGE** Section.



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7) The **GREEN** Section contains:

- **TABLE 1 - INITIAL ISOLATION AND PROTECTIVE ACTION DISTANCES** that provides the distances recommended to protect people from vapours resulting from spills involving dangerous goods, which are considered:
 - Toxic by inhalation (TIH)
 - Chemical Warfare Agents and
 - Substances which produce toxic gases upon contact with water

- In this table, the substances are presented in numerical order of their ID Numbers.



TABLE 1 - INITIAL ISOLATION AND PROTECTIVE ACTION DISTANCES

Page 300

ID No.	NAME OF MATERIAL	SMALL SPILLS (From a small package or small leak from a large package)				LARGE SPILLS (From a large package or from many small packages)			
		First ISOLATE in all Directions		Then PROTECT persons Downwind during-		First ISOLATE in all Directions		Then PROTECT persons Downwind during-	
		Meters	(Feet)	DAY Kilometers (Miles)	NIGHT Kilometers (Miles)	Meters	(Feet)	DAY Kilometers (Miles)	NIGHT Kilometers (Miles)
1005	Ammonia, anhydrous	30 m	(100 ft)	0.1 km (0.1 mi)	0.2 km (0.1 mi)	150 m	(500 ft)	0.8 km (0.5 mi)	2.3 km (1.4 mi)
1005	Anhydrous ammonia								
1008	Boron trifluoride	30 m	(100 ft)	0.1 km (0.1 mi)	0.6 km (0.4 mi)	300 m	(1000 ft)	1.9 km (1.2 mi)	4.8 km (3.0 mi)
1008	Boron trifluoride, compressed								
1016	Carbon monoxide	30 m	(100 ft)	0.1 km (0.1 mi)	0.1 km (0.1 mi)	150 m	(500 ft)	0.7 km (0.5 mi)	2.7 km (1.7 mi)
1016	Carbon monoxide, compressed								
1017	Chlorine	60 m	(200 ft)	0.4 km (0.3 mi)	1.6 km (1.0 mi)	600 m	(2000 ft)	3.5 km (2.2 mi)	8.0 km (5.0 mi)
1023	Coal gas	30 m	(100 ft)	0.1 km (0.1 mi)	0.1 km (0.1 mi)	60 m	(200 ft)	0.3 km (0.2 mi)	0.4 km (0.3 mi)
1023	Coal gas, compressed								
1026	Cyanogen	30 m	(100 ft)	0.2 km (0.1 mi)	0.9 km (0.5 mi)	150 m	(500 ft)	1.0 km (0.7 mi)	3.5 km (2.2 mi)
1026	Cyanogen gas								
1040	Ethylene oxide	30 m	(100 ft)	0.1 km (0.1 mi)	0.2 km (0.1 mi)	150 m	(500 ft)	0.8 km (0.5 mi)	2.5 km (1.6 mi)
1040	Ethylene oxide with Nitrogen								
1045	Fluorine	30 m	(100 ft)	0.1 km (0.1 mi)	0.3 km (0.2 mi)	150 m	(500 ft)	0.8 km (0.5 mi)	3.1 km (1.9 mi)
1045	Fluorine, compressed								
1048	Hydrogen bromide, anhydrous	30 m	(100 ft)	0.1 km (0.1 mi)	0.4 km (0.3 mi)	300 m	(1000 ft)	1.5 km (1.0 mi)	4.5 km (2.8 mi)
1050	Hydrogen chloride, anhydrous	30 m	(100 ft)	0.1 km (0.1 mi)	0.4 km (0.2 mi)	60 m	(200 ft)	0.3 km (0.2 mi)	1.4 km (0.9 mi)
1051	AC (when used as a weapon)	100 m	(300 ft)	0.3 km (0.2 mi)	1.1 km (0.7 mi)	1000 m	(3000 ft)	3.8 km (2.4 mi)	7.2 km (4.5 mi)
1051	Hydrocyanic acid, aqueous solutions, with more than 20% Hydrogen cyanide	60 m	(200 ft)	0.2 km (0.1 mi)	0.6 km (0.4 mi)	400 m	(1250 ft)	1.6 km (1.0 mi)	4.1 km (2.5 mi)
1051	Hydrogen cyanide, anhydrous, stabilized								
1051	Hydrogen cyanide, stabilized								
1052	Hydrogen fluoride, anhydrous	30 m	(100 ft)	0.1 km (0.1 mi)	0.5 km (0.3 mi)	300 m	(1000 ft)	1.7 km (1.1 mi)	3.6 km (2.2 mi)



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7) The **GREEN** Section also contains:

- **TABLE 2 - WATER-REACTIVE MATERIALS WHICH PRODUCE TOXIC GASES** that provides, for each of the materials listed, the toxic gas(es) produced when in contact with water.
- In this table, the substances are presented in numerical order of their ID Numbers.



TABLE 2 - WATER-REACTIVE MATERIALS WHICH PRODUCE TOXIC GASES

Materials Which Produce Large Amounts of Toxic-by-Inhalation (TIH) Gas(es) When Spilled in Water			
ID No.	Guide No.	Name of Material	TIH Gas(es) Produced
1162	155	Dimethyldichlorosilane	HCl
1183	139	Ethyldichlorosilane	HCl
1196	155	Ethyltrichlorosilane	HCl
1242	139	Methyldichlorosilane	HCl
1250	155	Methyltrichlorosilane	HCl
1295	139	Trichlorosilane	HCl
1298	155	Trimethylchlorosilane	HCl
1305	155P	Vinyltrichlorosilane	HCl
1305	155P	Vinyltrichlorosilane, stabilized	HCl
1340	139	Phosphorus pentasulfide, free from yellow and white Phosphorus	H ₂ S
1340	139	Phosphorus pentasulphide, free from yellow and white Phosphorus	H ₂ S
1360	139	Calcium phosphide	PH ₃
1384	135	Sodium dithionite	H ₂ S SO ₂
1384	135	Sodium hydrosulfite	H ₂ S SO ₂
1384	135	Sodium hydrosulphite	H ₂ S SO ₂
1397	139	Aluminum phosphide	PH ₃
1412	139	Lithium amide	NH ₃
1419	139	Magnesium aluminum phosphide	PH ₃
1432	139	Sodium phosphide	PH ₃
1541	155	Acetone cyanohydrin, stabilized	HCN
1680	157	Potassium cyanide	HCN
1680	157	Potassium cyanide, solid	HCN
1689	157	Sodium cyanide	HCN
1689	157	Sodium cyanide, solid	HCN

Chemical Symbols for TIH Gases:

Br ₂	Bromine	HF	Hydrogen fluoride	PH ₃	Phosphine
Cl ₂	Chlorine	HI	Hydrogen iodide	NO ₂	Nitrogen dioxide
HBr	Hydrogen bromide	H ₂ S	Hydrogen sulfide	SO ₂	Sulfur dioxide
HCl	Hydrogen chloride	H ₂ S	Hydrogen sulphide	SO ₂	Sulphur dioxide
HCN	Hydrogen cyanide	NH ₃	Ammonia		



ERG2008

TABLE 1 - INITIAL ISOLATION AND PROTECTIVE ACTION DISTANCES

provides, for small and large spills:

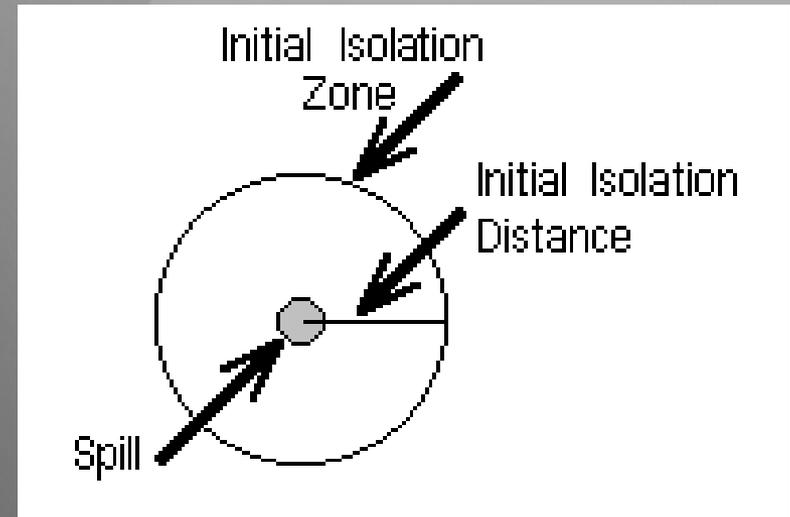
- The Initial Isolation Zone.
- The suggested Protective Action Zone, **downwind**, for **day and night**.
- The distances show the areas likely to be affected during the first 30 minutes after the materials are spilled, and this distance could increase with time.



ERG2008

➤ Initial Isolation Zone

- Defines an area SURROUNDING the incident in which persons may be exposed to dangerous (upwind) and life threatening (downwind) concentrations of material.





ERG2008

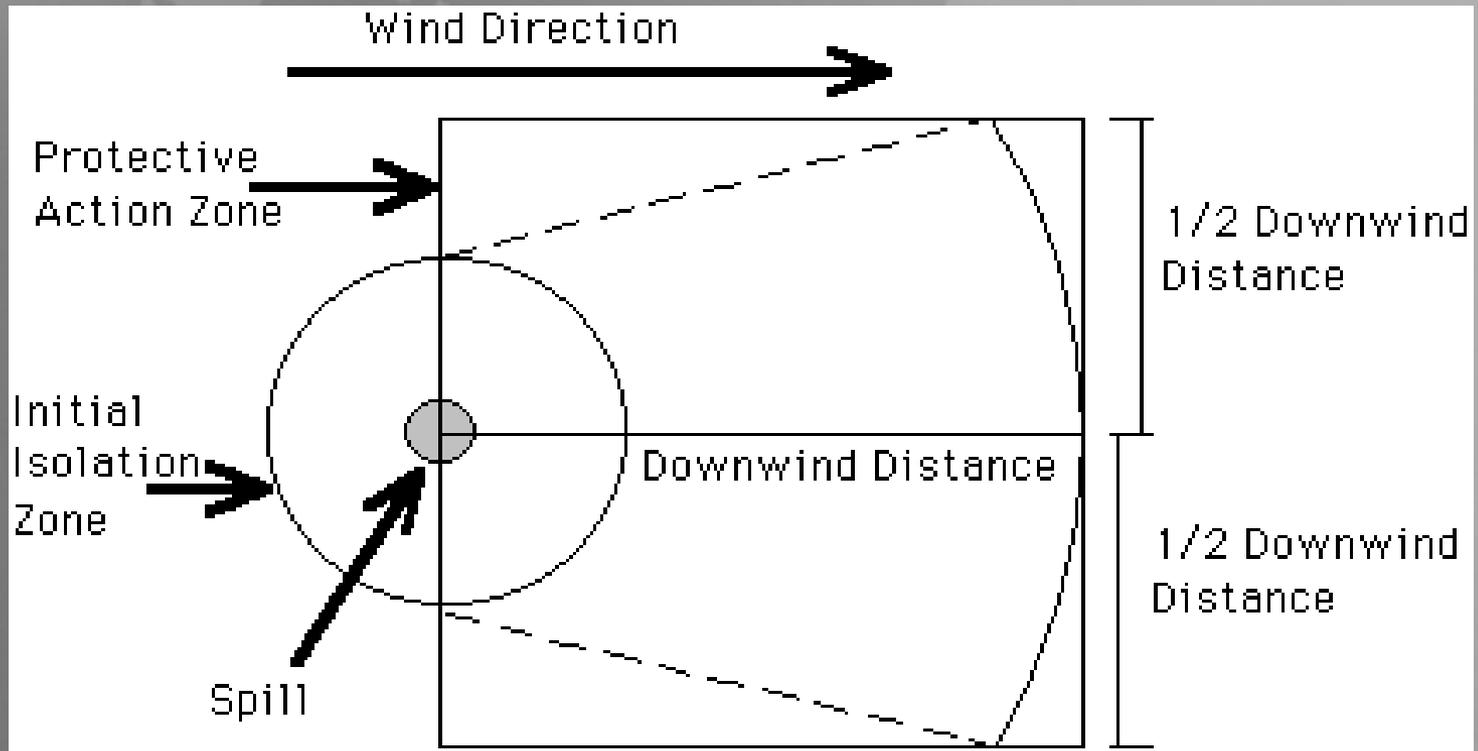
➤ Protective Action Zone

- Defines an area DOWNWIND from the incident in which persons may become incapacitated and unable to take protective action and/or incur serious or irreversible health effects;
- For practical purposes, the Protective Action Zone is a square, whose length and width are the same as the downwind distance shown in the Table (see drawing next page);
- The Protective Actions are: evacuation, shelter in place or a combination of both.



ERG2008

➤ Protective Action Zone





ERG2008

➤ **Protective Action Zone: Day and Night**

- It is important to note that Protective Action Zones do not only depend on the mere presence of gases/vapours but mainly on its concentration in the air:
- During the day, there is an increase of the atmospheric disturbances creating a greater dispersion (dilution) of the gases/vapours, which results in a weaker toxic concentration in the air and thus requires a smaller Protective Action Zone than at night.
- During the night, the gases/vapours will calmly dissipate. This will result in a higher toxic concentration in the air and consequently, necessitate a greater Protective Action Zone.



ERG2008

➤ **Small and large spills**

- **Small Spill:** Generally involves a single small package (e.g., a drum containing up to approximately 200 litres), a small cylinder or a small leak from a large package.
- **Large Spill:** Generally, a spill which involves a large package (more than 200 litres) or multiple spills from many small packages.
- For any intermediate quantity, the distances would need to be estimated between the distances provided for small and large spills.



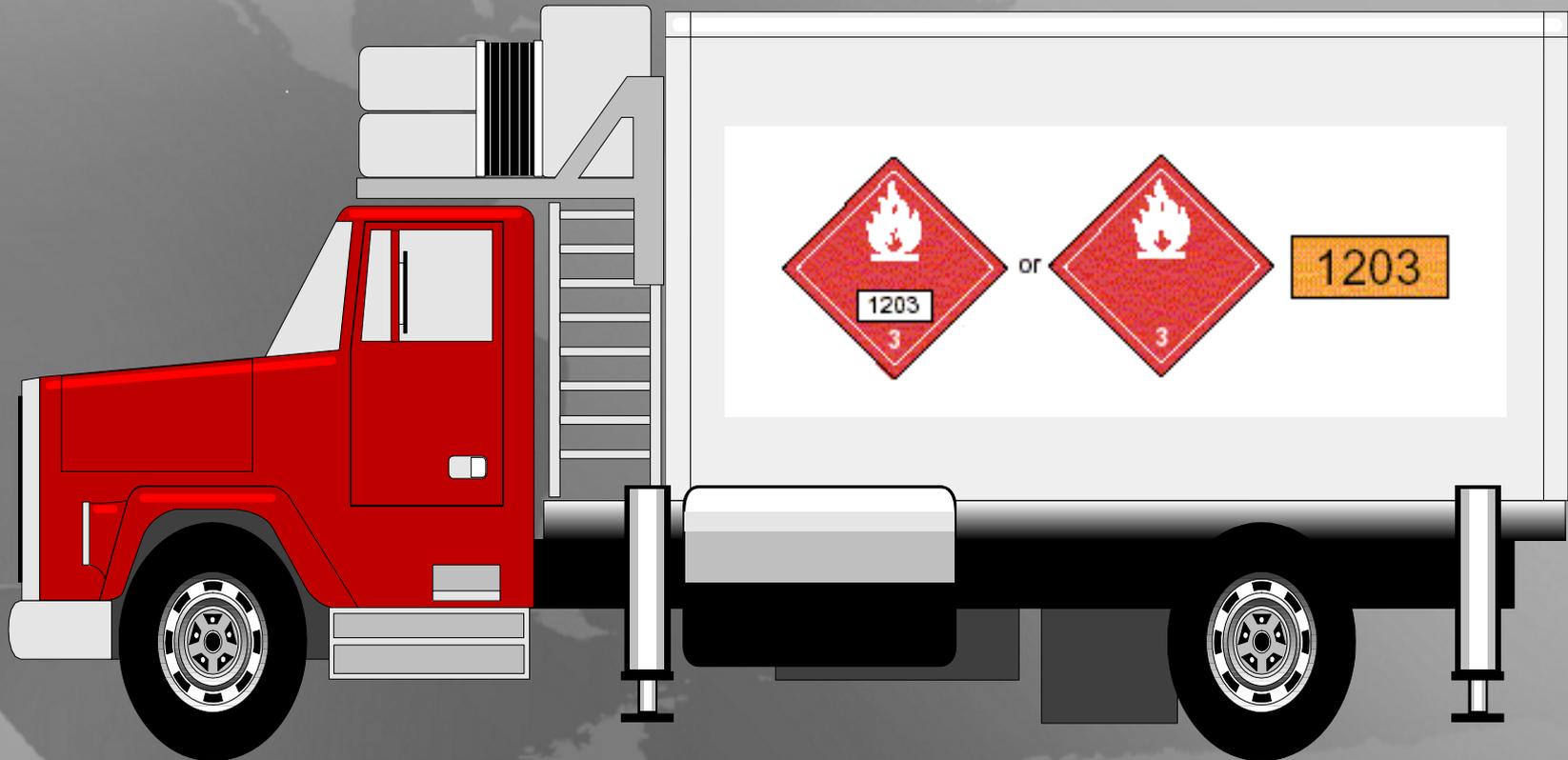
How to use the ERG2008

- 1) Identify the material by finding any one of the following information:



How to use the ERG2008

A) The 4-digit ID Number on a placard or orange panel;





How to use the ERG2008

B) The 4-digit ID Number (following UN or NA) on a shipping document or package;

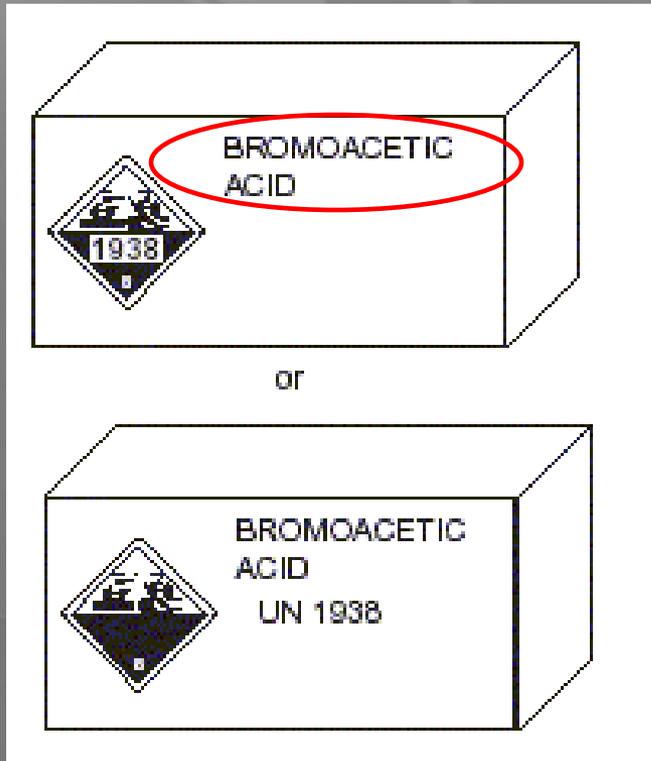
SHIPPING DOCUMENT						
Destination(City-Town) Name: <i>Company ABC</i> Address: <i>1234 Main st. Town, Province</i>			Consignor Name: <i>Company DEF</i> Address: <i>5678 1st Avenue Town, Province</i>			
Name of carrier <i>Transport ABC</i>	Prepaid <input checked="" type="checkbox"/>	Collect <input type="checkbox"/>	Transport unit no. <i>1</i>			
Point of origin		Shipping date <i>05/01/2005</i>	Shipper's no. <i>1234</i>			
REGULATED DANGEROUS GOODS			24 HOUR NUMBER: <i>613-996-6666</i> ERP reference & telephone number: <i>N/A</i>			
Shipping name (technical name) if applicable	class primary	class subsi- diary	UN number	packing group/ risk group	quantity	packages requiring labels
<i>Gasoline</i>	<i>3</i>	<i>-</i>	<i>1203</i>	<i>II</i>	<i>6000L</i>	<i>—</i>
THIS IS TO CERTIFY THAT THE ABOVE NAMED ARTICLES ARE PROPERLY CLASSIFIED, DESCRIBED, PACKAGED, MARKED AND LABELLED AND ARE IN PROPER CONDITION FOR TRANSPORTATION ACCORDING TO THE <i>TRANSPORTATION OF DANGEROUS GOODS REGULATIONS</i>						
SPECIAL INSTRUCTIONS						
NON REGULATED GOODS						
Packages	Description of articles					Weight
Received in apparent good order			Consignee's signature		Shipper's signature	
Received above in apparent good order			Driver's signature		Drivers' no.	

Example of a shipping document



How to use the ERG2008

C) The name of the material on a shipping document or package.



Example of a package

SHIPPING DOCUMENT						
Destination(City-Town) Name: <i>Company ABC</i> Address: <i>1234 Main st.</i> <i>Town, Province</i>			Consignor Name: <i>Company DEF</i> Address: <i>5678 1st Avenue</i> <i>Town, Province</i>			
Name of carrier <i>Transport ABC</i>	Prepaid <input checked="" type="checkbox"/>	Collect <input type="checkbox"/>	Transport unit no. <i>1</i>			
Point of origin	Shipping date <i>05/01/2005</i>		Shipper's no. <i>1234</i>			
REGULATED DANGEROUS GOODS			24 HOUR NUMBER: <i>613-996-6666</i> ERP reference & telephone number: <i>N/A</i>			
Shipping name (technical name) if applicable	class primary	class subsidiary	UN number	packing group/risk group	quantity	packages requiring labels
<i>Gasoline</i>	<i>3</i>	<i>-</i>	<i>1203</i>	<i>II</i>	<i>6000L</i>	<i>-</i>
THIS IS TO CERTIFY THAT THE ABOVE NAMED ARTICLES ARE PROPERLY CLASSIFIED, DESCRIBED, PACKAGED, MARKED AND LABELLED AND ARE IN PROPER CONDITION FOR TRANSPORTATION ACCORDING TO THE TRANSPORTATION OF DANGEROUS GOODS REGULATIONS						
SPECIAL INSTRUCTIONS						
NON REGULATED GOODS						
Packages	Description of articles					Weight
Received in apparent good order					Consignee's signature <i>[Signature]</i>	
Received above in apparent good order					Driver's signature <i>[Signature]</i>	
					Shipper's signature <i>[Signature]</i>	
					Drivers' no.	

Example of a shipping document



How to use the ERG2008

- 2) Look up the material's 3-digit Guide number in either:
- The ID Number index (**YELLOW**-bordered pages);
 - The name of material index (**BLUE**-bordered pages);
 - Note if the substance is highlighted in **GREEN**;
 - As a *last resort*, if the ID number or the name of material are not available, use the Table of Placards and/or the Rail Car & Road Trailer Identification Charts.



How to use the ERG2008

- 3) Turn to the numbered guide (**ORANGE**-bordered pages):
 - Read carefully all the information provided in the **ORANGE** Guide and use jointly the **GREEN** Section if the substance is highlighted.



How to use the ERG2008

- **CAUTION:** If a reference to a guide cannot be found and the incident is believed to involve dangerous goods:

Turn to **GUIDE 111**

and use it until additional information becomes available.

- If the incident involves explosives:



- Use **GUIDE 112** for all explosives, except:
- For Class 1.4 Explosives, use **GUIDE 114**.



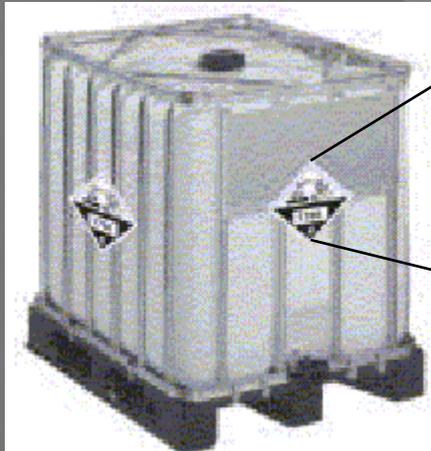
Examples

- For each of the following examples:
 - Find the **ORANGE**-bordered Guide-pages using the information provided;
 - Identify the suggested distances / zones in the **ORANGE** and/or **GREEN** Sections;
 - Describe the main characteristics and hazards of the substance.



Example 1

- A 1000-litre tote container is leaking.





Solution for Example 1



- ID No. is 1824;
- The **YELLOW**-bordered pages indicate that the name of the material is *Sodium hydroxide, solution* or *Caustic soda, solution* and refers to **Guide 154**;
- The substance is not highlighted; there is no need to use the **GREEN** Section;
- The **Guide 154** corresponds to *Substances - Toxic and/or Corrosive (Non-Combustible)*;
- As an immediate precautionary measure, the Guide suggests to isolate the spill or leak area in all directions for at least 50 metres for liquids;



Solution for Example 1



- In **Guide 154**, under the *Potential Hazards* Section, the *Health* hazards precede the *Fire or Explosion* hazards;
- This type of substance is toxic by inhalation / ingestion / skin contact and may cause severe injury or death;
- Effect of contact or inhalation may be delayed;
- Fire may produce irritating, corrosive and/or toxic gases;
- This type of substance is non-combustible.



Example 2

- A tanker truck carrying the following product rolled over and is leaking from the top hatch.





Solution for Example 2



- The ID No. is 1202 and it is a flammable liquid (Class 3, red placard);
- The **YELLOW**-bordered pages indicate that the substance is *Diesel fuel* or *Fuel oil*, and refers to **Guide 128**;
- The substance is not highlighted; there is no need to use the **GREEN** Section;
- The **Guide 128** corresponds to *Flammable Liquids (Non-Polar / Water-Immiscible)*;
- As an immediate precautionary measure, the Guide suggests to isolate spill or leak area for at least 50 metres in all directions. If the spill is large, the Guide suggests to consider an initial downwind evacuation of at least 300 metres;



Solution for Example 2



- At **Guide 128**, under the *Potential Hazards* Section, the *Fire or Explosion* hazards precede the *Health* hazards;
- This type of substance is flammable and vapours may form explosive mixture with air;
- Most vapours are heavier than air, they will spread along the ground and collect in low or confined areas;
- Containers may explode when heated;
- Inhalation or contact with material may irritate or burn skin and eyes.



Example 3

- A truck displaying this placard is on fire on the side of the road.





Solution for Example 3



- The placard indicates the material is an explosive of class 1.4G;
- According to the Table of placards, **Guide 114** must be used when explosives in class 1.4 are involved;
- Explosives are not highlighted; there is no need to refer to the **GREEN** Section (see Explosives in the **BLUE** Section);
- In case the truck is involved in a fire, the Guide suggests to isolate for 500 metres in all directions and to initiate an evacuation, including emergency responders, for 500 metres in all directions;



Solution for Example 3



- At **Guide 114**, under the *Potential Hazards* Section, the *Fire or Explosion* hazards precede the *Health* hazards;
- This type of substance may explode and throw fragments at a distance of 500 metres or more if fire reaches cargo;
- Fire may produce irritating, corrosive and/or toxic gases.



Example 4

- A tanker truck is involved in a road accident.





Solution for Example 4



- The ID No. is 1072;
- The **YELLOW**-bordered pages indicate that the product is *Oxygen, compressed* and refers to **Guide 122**;
- The substance is not highlighted; there is no need to use the **GREEN** Section;
- The **Guide 122** corresponds to *Gases - Oxidizing (Including Refrigerated Liquids)*;
- As an immediate precautionary measure, the Guide suggests to isolate spill or leak area for at least 100 metres in all directions;
- In case of a large spill, the Guide suggests to consider an initial downwind evacuation of at least 500 metres;



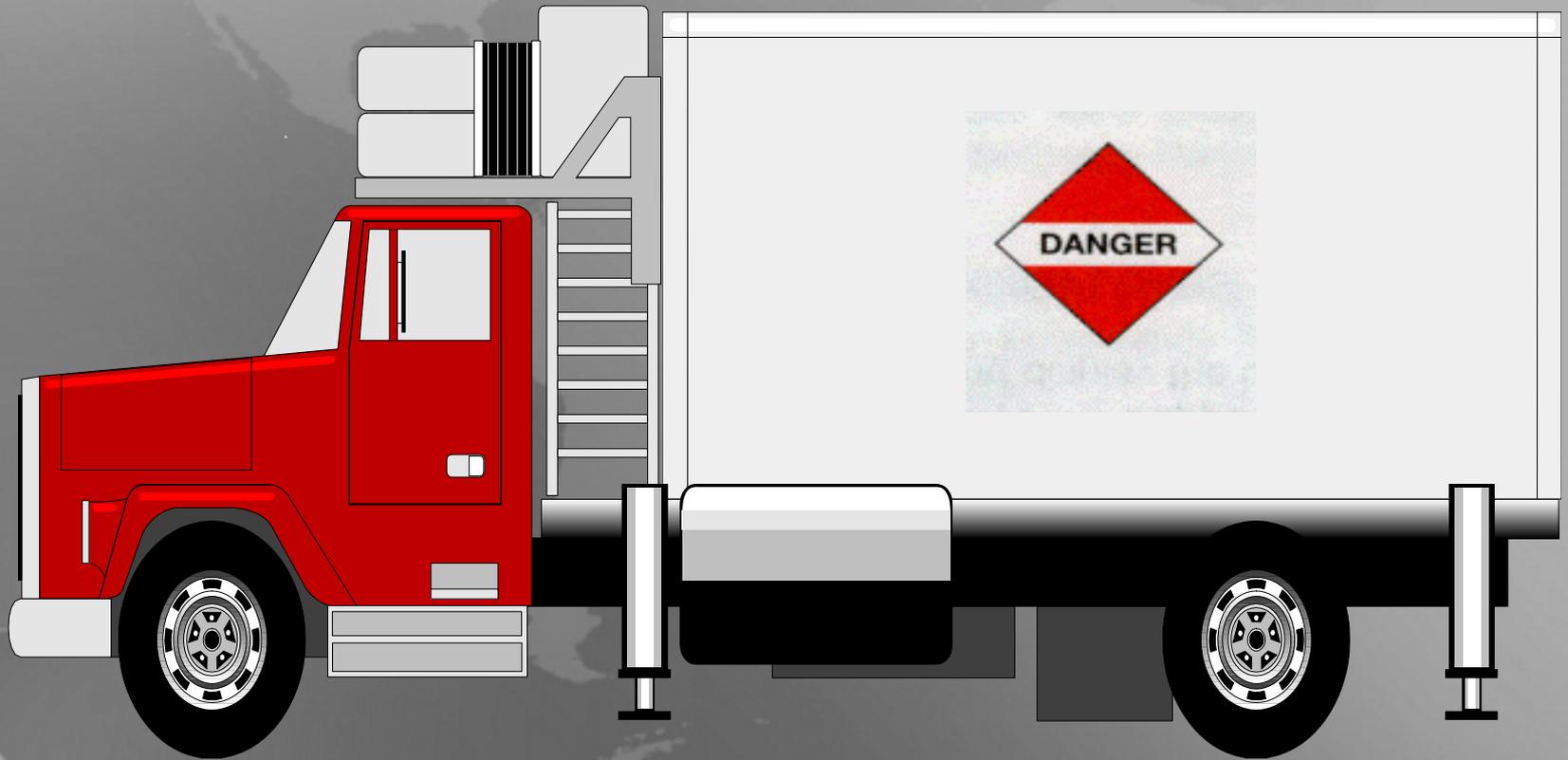
Solution for Example 4



- At **Guide 122**, under the *Potential Hazards* Section, the *Fire or Explosion* hazards precede the *Health* hazards;
- This type de substance does not burn, but will support combustion;
- Some may react explosively with fuels;
- Containers may explode when heated;
- Vapours may cause dizziness or asphyxiation without warning.

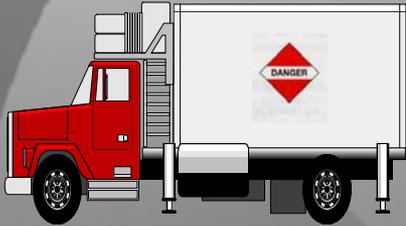


Example 5





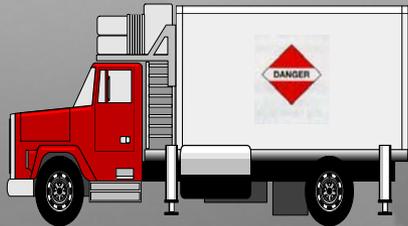
Solution for Example 5



- There is no ID No. and the DANGER placard indicates a mixed load of dangerous goods;
- In this case, refer to **Guide 111, *Mixed Load / Unidentified Cargo***;
- As an immediate precautionary measure, the Guide suggests to isolate the area for at least 100 metres in all directions, until the contents of the vehicle is known;
- In case of fire, the Guide suggests to isolate for 800 metres in all directions and to consider an initial evacuation of 800 metres in all directions;



Solution for Example 5



- At **Guide 111**, under the *Potential Hazards* Section, the *Fire or Explosion* hazards precede the *Health* hazards;
- Until the vehicle content is known, all hazards must be considered: flammability, corrosivity, toxicity...



Example 6

- A rail car is leaking at a well-known facility in your area, where chlorine cars are handled.



KTVI-TV St.Louis, Missouri, USA





Solution for Example 6



KTVI-TV St.Louis, Missouri, USA

- The product involved is *Chlorine*;
- The **BLUE**-bordered pages indicate that the ID number is 1017, refers to **Guide 124** and the substance is highlighted;
- The **Guide 124** corresponds to *Gases – Toxic and/or Corrosive – Oxidizing*;
- Because the substance is highlighted and there is a spill situation, the Initial Isolation and Protective Action Distances must be taken from the **GREEN** Section;
- For ID 1017, the **GREEN** Section suggests, for large spills, 600 metres as an Initial Isolation Distance;





Solution for Example 6



KTVI-TV St.Louis, Missouri, USA

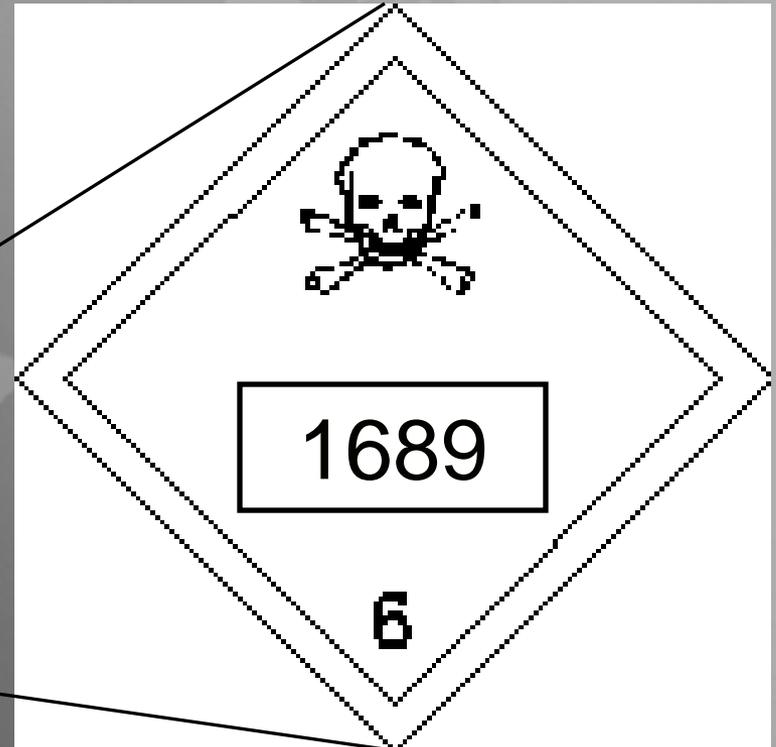
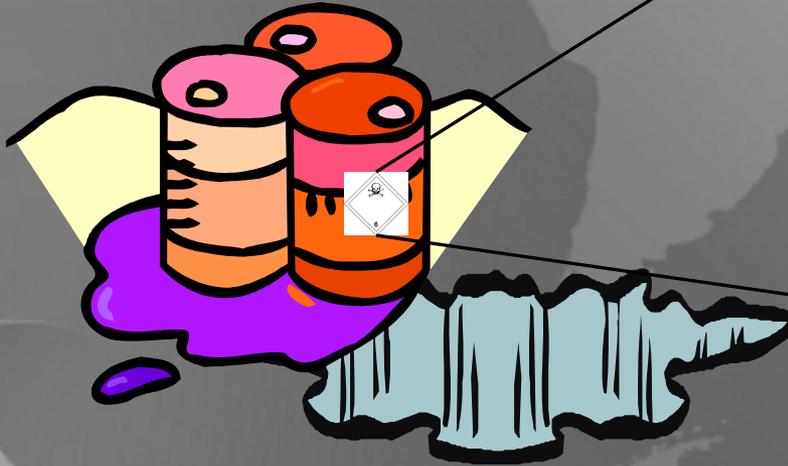
- For ID 1017, the **GREEN** Section suggests, for large spills during the day, 3.5 km as a Protective Action Distance;
- The Emergency Responders will have to decide which Protective Action will be pursued: evacuation, shelter in place, or a combination of both;
- At **Guide 124**, under *Potential Hazards*, the *Health* hazards precede the *Fire or Explosion* hazards;
- The **Guide 124** indicates that this product is toxic and may be fatal if inhaled or absorbed through the skin.





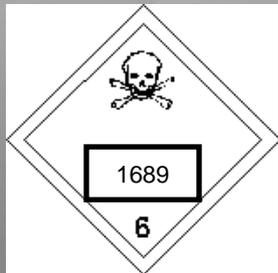
Example 7

- A drum is leaking in a puddle of water.





Solution for Example 7



- The ID Number is 1689;
- The **YELLOW**-bordered pages indicate that this substance is *Sodium cyanide*;
- It refers to **Guide 157** and the substance is highlighted;
- The **Guide 157** corresponds to *Substances – Toxic and/or Corrosive (Non-Combustible / Water-Sensitive)*;
- The substance is highlighted and there is a spill situation: the **GREEN** Section must be used to determine the Initial Isolation and Protective Action Distances;



Solution for Example 7



- Under ID No.1689, the **GREEN** Section suggests distances specifically when the product is spilled in water. If this is not the case, the initial isolation and evacuation distances must be taken from **Guide 157**, under *Public Safety*;
- Since the product is leaking in water, the **GREEN** Section suggests an Initial Isolation Distance of 30 metres in all directions for a small spill and 100 metres in all directions for a large spill;
- Additionally, the Protective Action Distances for day and night will have to be taken from the **GREEN** Section;



Solution for Example 7



- The **Guide 157** indicates that this type of substance is toxic and non-combustible, but fire will produce irritating, corrosive and/or toxic gases;
- For a water-reactive substance (mention **when spilled in water** in Table 1) , refer to the last pages of the **GREEN** Section (Table 2), where the TIH gases produced are listed, for each water-reactive substance; in this case the gas produced is *HCN* or *Hydrogen cyanide*;
- Searching for *Hydrogen cyanide* in the **BLUE** Section, there is a reference to **Guide 117**, which correspond to *Gases – Toxic – Flammable (Extreme Hazard)*.



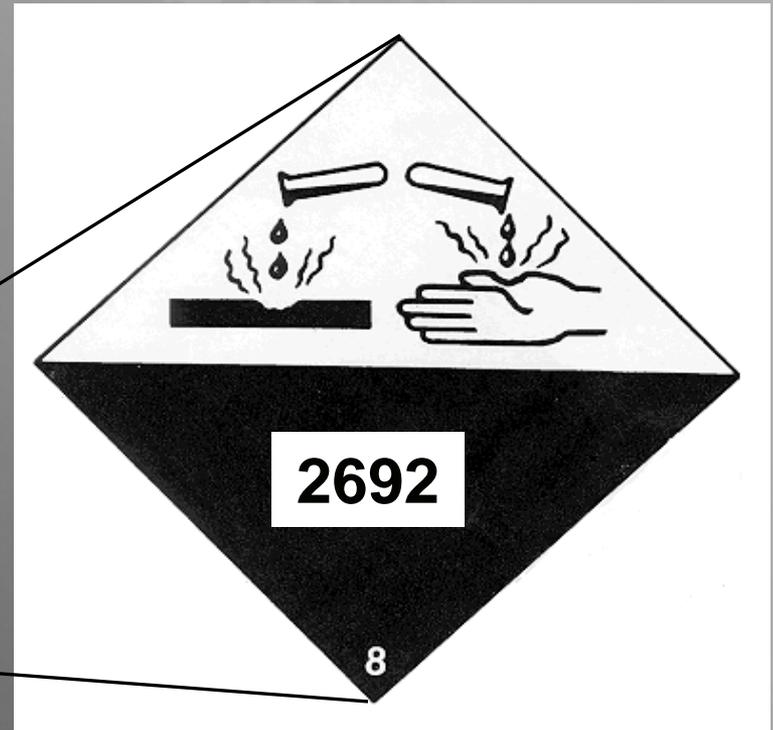
Solution for Example 7



- NOTE: In the **GREEN** section (Table 1), you must use the Initial Isolation and Protective Action Distances (IIPAD) for the water reactive material itself (**when spilled in water**) (*in this case UN1689*) and not the IIPAD for the generated TIH gas (*Hydrogen cyanide*).

Example 8

- A drum containing this substance is punctured and is leaking on the ground.





Solution for Example 8



- The ID No. is 2692;
- The **YELLOW**-bordered pages indicate that this substance is called *Boron tribromide*;
- It refers to **Guide 157** and is highlighted;
- The **Guide 157** correspond to *Substances – Toxic and/or Corrosive (Non-Combustible / Water-Sensitive)*;
- Since the substance is highlighted and there is a spill situation, the **GREEN** Section must be used to determine the Initial Isolation and Protective Action Distances;
- For this product, the **GREEN** Section presents 2 separate entries for ID No. 2692: the 1st one applies when the product is spilled on the ground and the 2nd one, when it is spilled in water;



Solution for Example 8



- In this case, the product is spilled on the ground and the Initial Isolation Distance suggested in the **GREEN** Section is 30 metres in all directions for a small spill and 60 metres in all directions for a large spill;
- Additionally, the Protective Action Distances for day and night will have to be taken from the **GREEN** Section;
- The **Guide 157** indicates that this type of substance is toxic and non-combustible, but a fire will produce irritating, corrosive and/or toxic gases.



Example 9

- An alert for Sarin gas was activated in a building.





Solution for Example 9



- The product involved is *Sarin*;
- The **BLUE**-bordered pages indicate that the ID No. is 2810;
- It refers to **Guide 153** and the substance is highlighted;
- The **Guide 153** corresponds to *Substances – Toxic and/or Corrosive (Combustible)*;
- Since the substance is highlighted and there is a spill situation (type of dispersion is unknown), the **GREEN** Section must be used to determine the Initial Isolation and Protective Action Distances;
- In the **GREEN** Section, there are multiple entries for ID No. 2810; select *Sarin (when used as a weapon)*;



Solution for Example 9



- The **GREEN** Section suggests an Initial Isolation Distance of 60 metres in all directions for a small spill and 800 metres in all directions for a large spill; these distances will have to be adapted considering that the incident takes place inside a building;
- Additionally, the Protective Action Distances for day and night will have to be taken from the **GREEN** Section, and adapted;
- The **Guide 153** indicates that this type of substance is toxic and the effects of contact or inhalation may be delayed;
- The **Guide 153** also indicates that the substance is combustible, may burn, but does not ignite readily; a fire may produce irritating, corrosive and/or toxic gases.



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