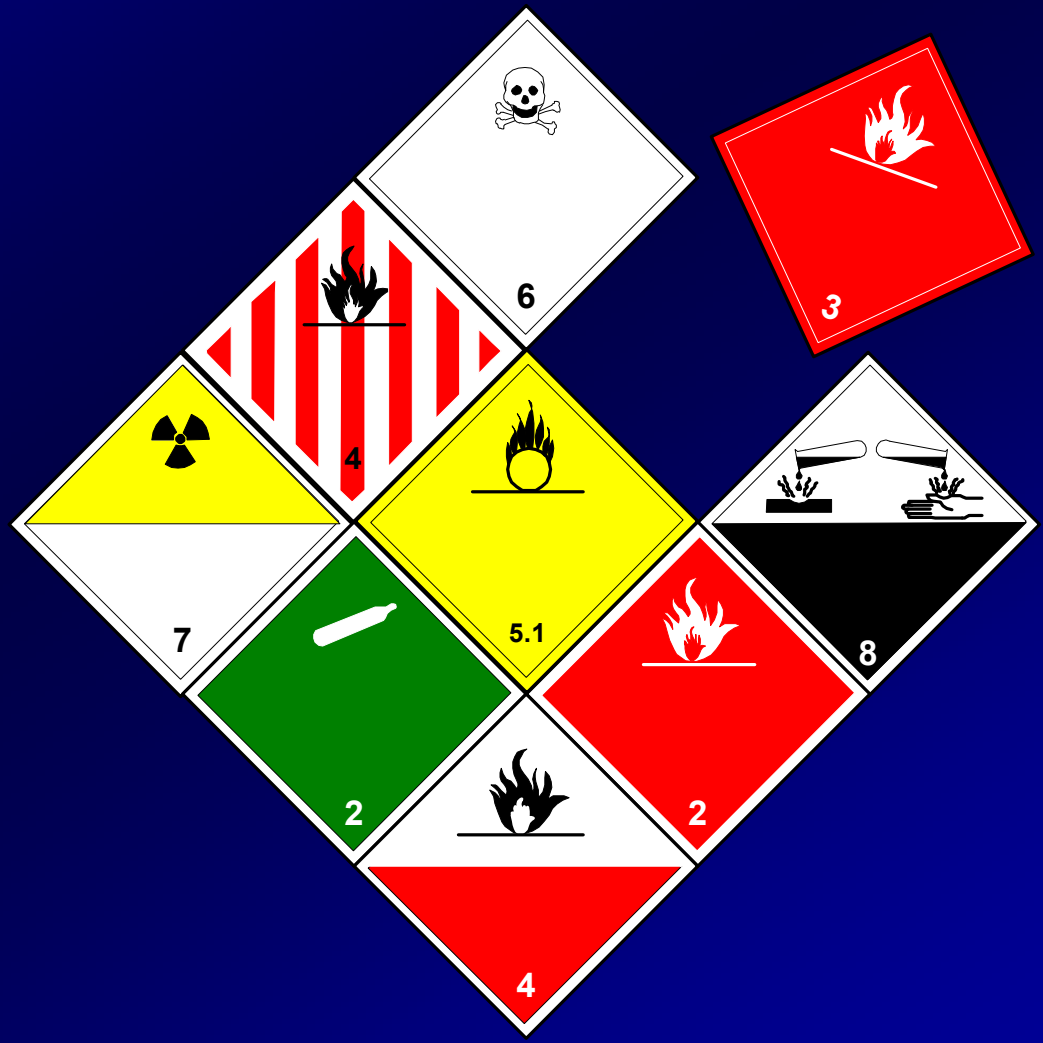
Emergency Response Guidebook

SAND2008-3495C

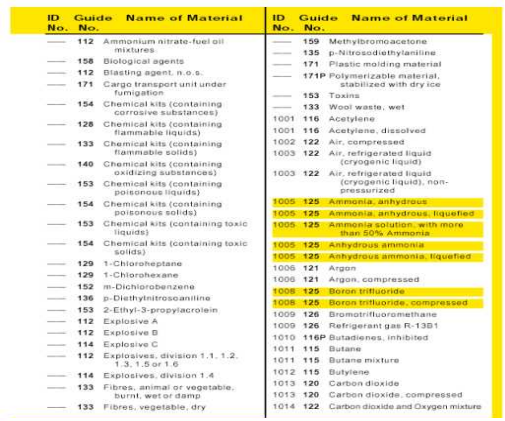
2004



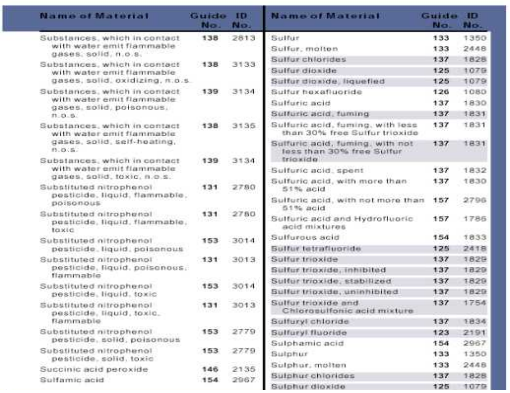
SAND No.
Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

International
BIOLOGICAL THREAT REDUCTION

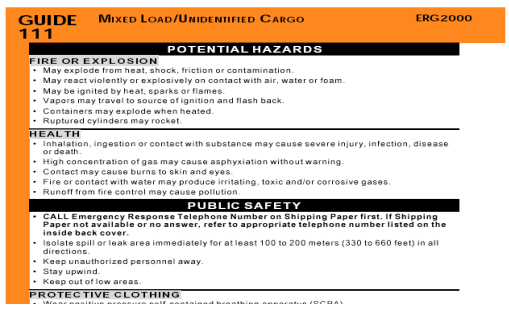
Module Overview



ID No.	Guide No.	Name of Material
——	112	Ammonium nitrate-fuel oil mixtures
——	158	Biological agents
——	112	Blasting agent, n.o.s.
——	171	Cargo transport unit under fumigation
——	154	Chemical kits (containing corrosive substances)
——	126	Chemical kits (containing flammable liquids)
——	133	Chemical kits (containing flammable solids)
——	140	Chemical kits (containing oxidizing substances)
——	153	Chemical kits (containing poisonous liquids)
——	154	Chemical kits (containing poisonous solids)
——	153	Chemical kits (containing toxic liquids)
——	154	Chemical kits (containing toxic solids)
——	129	1-Chloroheptane
——	129	1-Chlorohexane
——	152	m-Dichlorobenzene
——	136	p-Diethylnitrosoaniline
——	153	2-Ethyl-3-propylacrolein
——	112	Explosive A
——	112	Explosive B
——	114	Explosive C
——	112	Explosives, division 1.1, 1.2, 1.3, 1.5 or 1.6
——	114	Explosives, division 1.4
——	133	Fibres, animal or vegetable, burnt, wet or damp
——	133	Fibres, vegetable, dry
——	159	Methylbromoacetone
——	135	p-Nitrosodiethylaniline
——	171	Plastic molding material
——	171P	Polymerizable material, stabilized with dry ice
——	153	Toxins
——	133	Wool waste, wet
1001	116	Acetylene
1001	116	Acetylene, dissolved
1002	122	Air, compressed
1003	122	Air, refrigerated liquid (cryogenic liquid)
1003	122	Air, refrigerated liquid (cryogenic liquid), non-pressurized
1005	125	Ammonia, anhydrous
1005	125	Ammonia, anhydrous, liquefied
1005	125	Ammonia solution, with more than 50% Ammonia
1005	125	Anhydrous ammonia
1005	125	Anhydrous ammonia, liquefied
1006	121	Argon
1006	121	Argon, compressed
1008	125	Boron trifluoride
1008	125	Boron trifluoride, compressed
1009	126	Bromotrifluoromethane
1009	126	Refrigerant gas R-13B1
1010	116P	Butadienes, inhibited
1011	115	Butane
1011	115	Butane mixture
1012	115	Butylene
1013	120	Carbon dioxide
1013	120	Carbon dioxide, compressed
1014	122	Carbon dioxide and Oxygen mixture



Name of Material	Guide No.	ID No.
Substances, which in contact with water emit flammable gases, solid, n.o.s.	138	2813
Substances, which in contact with water emit flammable gases, solid, oxidizing, n.o.s.	138	3133
Substances, which in contact with water emit flammable gases, solid, poisonous, n.o.s.	139	3134
Substances, which in contact with water emit flammable gases, solid, self-heating, n.o.s.	138	3135
Substances, which in contact with water emit flammable gases, solid, toxic, n.o.s.	139	3134
Substituted nitrophenol pesticide, liquid, flammable, poisonous	131	2780
Substituted nitrophenol pesticide, liquid, flammable, toxic	131	2780
Substituted nitrophenol pesticide, liquid, poisonous	153	3014
Substituted nitrophenol pesticide, liquid, poisonous, flammable	131	3013
Substituted nitrophenol pesticide, liquid, toxic	153	3014
Substituted nitrophenol pesticide, liquid, toxic, flammable	131	3013
Substituted nitrophenol pesticide, solid, poisonous	153	2779
Substituted nitrophenol pesticide, solid, toxic	153	2779
Succinic acid peroxide	146	2135
Sulfamic acid	154	2967
Sulfur	133	1350
Sulfur, molten	133	2448
Sulfur chlorides	137	1828
Sulfur dioxide	125	1079
Sulfur dioxide, liquefied	125	1079
Sulfur hexafluoride	126	1080
Sulfuric acid	137	1830
Sulfuric acid, fuming	137	1831
Sulfuric acid, fuming, with less than 30% free Sulfur trioxide	137	1831
Sulfuric acid, fuming, with not less than 30% free Sulfur trioxide	137	1831
Sulfuric acid, spent	137	1832
Sulfuric acid, with more than 51% acid	137	1830
Sulfuric acid, with not more than 51% acid	157	2796
Sulfuric acid and Hydrofluoric acid mixtures	157	1786
Sulfurous acid	154	1833
Sulfur tetrafluoride	125	2418
Sulfur trioxide	137	1829
Sulfur trioxide, inhibited	137	1829
Sulfur trioxide, stabilized	137	1829
Sulfur trioxide, uninhibited	137	1829
Sulfur trioxide and Chlorosulfonic acid mixture	137	1754
Sulfuryl chloride	137	1834
Sulfuryl fluoride	123	2191
Sulphamic acid	154	2967
Sulphur	133	1350
Sulphur, molten	133	2448
Sulphur chlorides	137	1828
Sulphur dioxide	125	1079



GUIDE 111 MIXED LOAD/UNIDENTIFIED CARGO ERG2000

POTENTIAL HAZARDS

FIRE OR EXPLOSION
- May explode from heat, shock, friction or contamination.
- May react violently or explosively on contact with air, water or foam.
- May be ignited by heat, sparks or flames.
- Vapors may travel to source of ignition and flash back.
- Containers may explode when heated.
- Ruptured cylinders may rocket.

HEALTH
- Inhalation, ingestion or contact with substance may cause severe injury, infection, disease or death.
- High concentration of gas may cause asphyxiation without warning.
- Contact may cause burns to skin and eyes.
- Fire or contact with water may produce irritating, toxic and/or corrosive gases.
- Runoff from fire control 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.**
- Isolate spill or leak area immediately for at least 100 to 200 meters (330 to 660 feet) in all directions.
- Keep unauthorized personnel away.
- Stay upwind.
- Keep out of low areas.

PROTECTIVE CLOTHING
- Wear positive pressure self-contained breathing apparatus (SCBA)

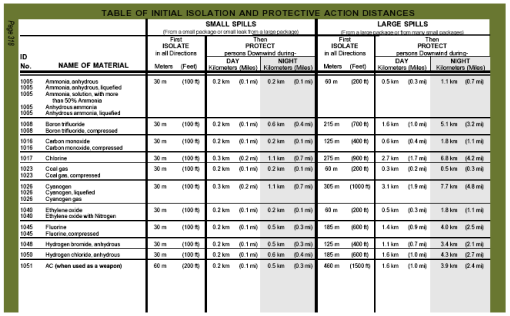
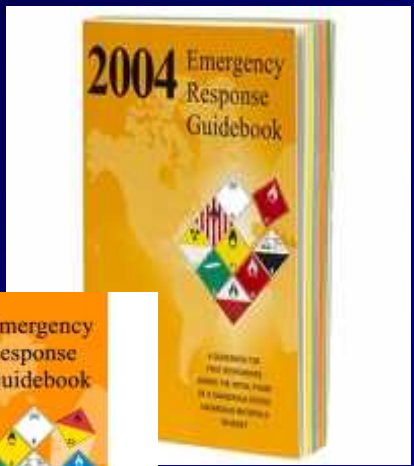
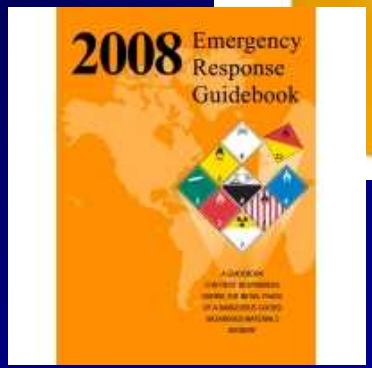


TABLE OF INITIAL ISOLATION AND PROTECTIVE ACTION DISTANCES

ID No.	NAME OF MATERIAL	SMALL SPILLS (From a small package or small leak from a large package) First ISOLATE in all Directions Meters	(Feet)	Then PROTECT persons Downwind during- DAY Kilometers	(Miles)	NIGHT Kilometers	(Miles)	LARGE SPILLS (From a large package or from many small packages) First ISOLATE in all Directions Meters	(Feet)	Then PROTECT persons Downwind during- DAY Kilometers	(Miles)	NIGHT Kilometers	(Miles)
1005	Ammonia, anhydrous	30 m	(100 ft)	0.2 km	(0.1 mi)	0.2 km	(0.1 mi)	90 m	(200 ft)	0.5 km	(0.3 mi)	1.1 km	(0.7 mi)
1005	Ammonia, anhydrous, liquefied												
1005	Ammonia, solution, with more than 50% Ammonia												
1005	Anhydrous ammonia												
1005	Anhydrous ammonia, liquefied												
1008	Boron trifluoride	30 m	(100 ft)	0.2 km	(0.1 mi)	0.6 km	(0.4 mi)	215 m	(700 ft)	1.6 km	(1.0 mi)	5.1 km	(3.2 mi)
1008	Boron trifluoride, compressed												
1016	Carbon monoxide	30 m	(100 ft)	0.2 km	(0.1 mi)	0.2 km	(0.1 mi)	125 m	(400 ft)	0.6 km	(0.4 mi)	1.8 km	(1.1 mi)
1016	Carbon monoxide, compressed												
1017	Chlorine	30 m	(100 ft)	0.3 km	(0.2 mi)	1.1 km	(0.7 mi)	275 m	(900 ft)	2.7 km	(1.7 mi)	6.8 km	(4.2 mi)
1023	Coal gas	30 m	(100 ft)	0.2 km	(0.1 mi)	0.2 km	(0.1 mi)	90 m	(200 ft)	0.3 km	(0.2 mi)	0.5 km	(0.3 mi)
1023	Coal gas, compressed												
1026	Cyanogen	30 m	(100 ft)	0.3 km	(0.2 mi)	1.1 km	(0.7 mi)	305 m	(1000 ft)	3.1 km	(1.9 mi)	7.7 km	(4.8 mi)
1026	Cyanogen, liquefied												
1026	Cyanogen gas												
1040	Ethylene oxide	30 m	(100 ft)	0.2 km	(0.1 mi)	0.2 km	(0.1 mi)	60 m	(200 ft)	0.5 km	(0.3 mi)	1.8 km	(1.1 mi)
1040	Ethylene oxide with Nitrogen												
1045	Fluorine	30 m	(100 ft)	0.2 km	(0.1 mi)	0.5 km	(0.3 mi)	185 m	(600 ft)	1.4 km	(0.9 mi)	4.0 km	(2.5 mi)
1045	Fluorine, compressed												
1048	Hydrogen bromide, anhydrous	30 m	(100 ft)	0.2 km	(0.1 mi)	0.5 km	(0.3 mi)	125 m	(400 ft)	1.1 km	(0.7 mi)	3.4 km	(2.1 mi)
1050	Hydrogen chloride, anhydrous	30 m	(100 ft)	0.2 km	(0.1 mi)	0.6 km	(0.4 mi)	185 m	(600 ft)	1.6 km	(1.0 mi)	4.3 km	(2.7 mi)
1051	AC (when used as a weapon)	60 m	(200 ft)	0.2 km	(0.1 mi)	0.5 km	(0.3 mi)	460 m	(1500 ft)	1.6 km	(1.0 mi)	3.9 km	(2.4 mi)

...ach
...OT ERG
...pose of the Guidebook
...nal sections and organization of the book
...nd hazard prediction and protection zones





International
BIOLOGICAL THREAT REDUCTION

Approaching the Scene

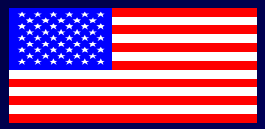
- **Upwind**
- **Uphill**
- **Upstream**

What is the ERG?

- A Guidebook for First Responders during the *initial phase* of a Dangerous Goods / Hazardous Materials Incident
- Aid to first responders in managing and controlling hazardous materials releases
- The 2008 edition of the Emergency Response Guidebook is the most current edition available
- The text is published on a four year cycle (it was three years previous to Y2K)
- An incident can be managed using any edition of the ERG, as long as all responders are advised what edition the Incident Commander is using.
- Although primarily for transportation incidents, the ERG can be used for fixed facilities releases.
- Developed by:

TC

Transport Canada



DOT

U.S. Department of Transportation

SCT

Secretariat of Transport and Communications of Mexico

Vocabulary

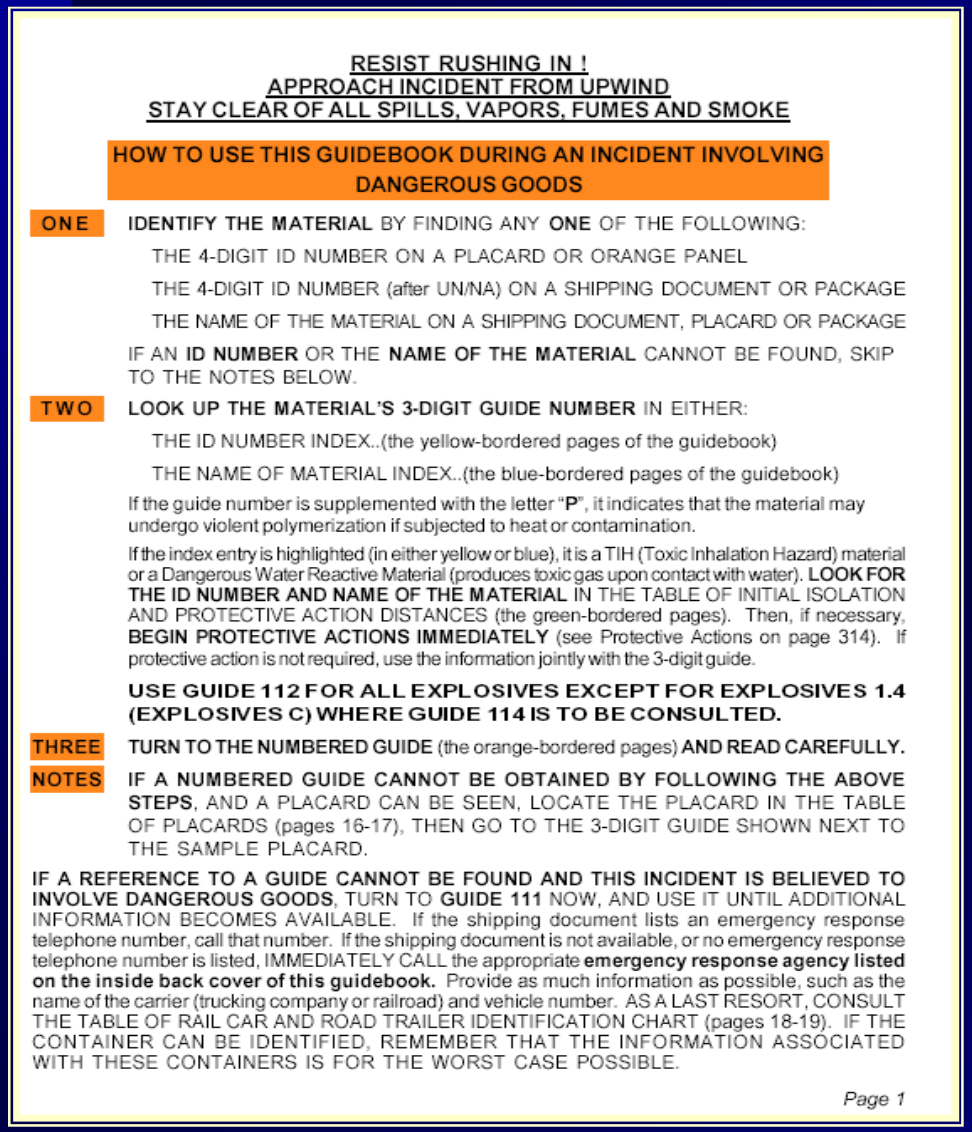
- **Hazardous Materials Spills –**
  - **Small Spill:** generally equal to or less than 55 gallons, 200 pounds, or 200 cubic feet of a gas.
  - **Large spill:** generally greater than 55 gallons, 200 pounds, or 200 cubic **feet of a gas.**
- **For marine pollutants –**
  - A reportable spill is anything greater than 450 liters (119 gallons) or 400 kg (882 pounds)

- **P -**The letter "P" following a guide number in the yellow-bordered and **blue-bordered** pages identifies a material which may polymerize violently under high temperature conditions or contamination with other products. This polymerization will produce heat and high pressure buildup in containers which may explode or rupture. (See polymerization below.)

- **Polymerization –** a chemical reaction which is generally associated with the production of plastic substances. Basically, the individual molecules of the chemical (liquid or gas) react with each other to produce what can be described as a long chain. These chains can be formed in many useful applications.

- **Toxic Inhalation Hazard (TIH) –**. Term used to describe gases and volatile liquids that are toxic when inhaled. (Same as Poison Inhalation Hazard, or PIH)

ERG White Pages



RESIST RUSHING IN !
APPROACH INCIDENT FROM UPWIND
STAY CLEAR OF ALL SPILLS, VAPORS, FUMES AND SMOKE

HOW TO USE THIS GUIDEBOOK DURING AN INCIDENT INVOLVING DANGEROUS GOODS

ONE **IDENTIFY THE MATERIAL** BY FINDING ANY **ONE** OF THE FOLLOWING:

THE 4-DIGIT ID NUMBER ON A PLACARD OR ORANGE PANEL

THE 4-DIGIT ID NUMBER (after UN/NA) ON A SHIPPING DOCUMENT OR PACKAGE

THE NAME OF THE MATERIAL ON A SHIPPING DOCUMENT, PLACARD OR PACKAGE

IF AN **ID NUMBER** OR THE **NAME OF THE MATERIAL** CANNOT BE FOUND, SKIP TO THE NOTES BELOW.

TWO **LOOK UP THE MATERIAL'S 3-DIGIT GUIDE NUMBER** IN EITHER:

THE ID NUMBER INDEX..(the yellow-bordered pages of the guidebook)

THE NAME OF MATERIAL INDEX..(the blue-bordered pages of the guidebook)

If the guide number is supplemented with the letter "**P**", it indicates that the material may undergo violent polymerization if subjected to heat or contamination.

If the index entry is highlighted (in either yellow or blue), it is a TIH (Toxic Inhalation Hazard) material or a Dangerous Water Reactive Material (produces toxic gas upon contact with water). **LOOK FOR THE ID NUMBER AND NAME OF THE MATERIAL** IN THE TABLE OF INITIAL ISOLATION AND PROTECTIVE ACTION DISTANCES (the green-bordered pages). Then, if necessary, **BEGIN PROTECTIVE ACTIONS IMMEDIATELY** (see Protective Actions on page 314). If protective action is not required, use the information jointly with the 3-digit guide.

USE GUIDE 112 FOR ALL EXPLOSIVES EXCEPT FOR EXPLOSIVES 1.4 (EXPLOSIVES C) WHERE GUIDE 114 IS TO BE CONSULTED.

THREE **TURN TO THE NUMBERED GUIDE** (the orange-bordered pages) **AND READ CAREFULLY.**

NOTES **IF A NUMBERED GUIDE CANNOT BE OBTAINED BY FOLLOWING THE ABOVE STEPS**, AND A PLACARD CAN BE SEEN, LOCATE THE PLACARD IN THE TABLE OF PLACARDS (pages 16-17), THEN GO TO THE 3-DIGIT GUIDE SHOWN NEXT TO THE SAMPLE PLACARD.

IF A REFERENCE TO A GUIDE CANNOT BE FOUND AND THIS INCIDENT IS BELIEVED TO INVOLVE DANGEROUS GOODS, TURN TO **GUIDE 111** NOW, AND USE IT UNTIL ADDITIONAL INFORMATION BECOMES AVAILABLE. If the shipping document lists an emergency response telephone number, call that number. If the shipping document is not available, or no emergency response telephone number is listed, IMMEDIATELY CALL the appropriate **emergency response agency listed on the inside back cover of this guidebook.** Provide as much information as possible, such as the name of the carrier (trucking company or railroad) and vehicle number. AS A LAST RESORT, CONSULT THE TABLE OF RAIL CAR AND ROAD TRAILER IDENTIFICATION CHART (pages 18-19). IF THE CONTAINER CAN BE IDENTIFIED, REMEMBER THAT THE INFORMATION ASSOCIATED WITH THESE CONTAINERS IS FOR THE WORST CASE POSSIBLE.

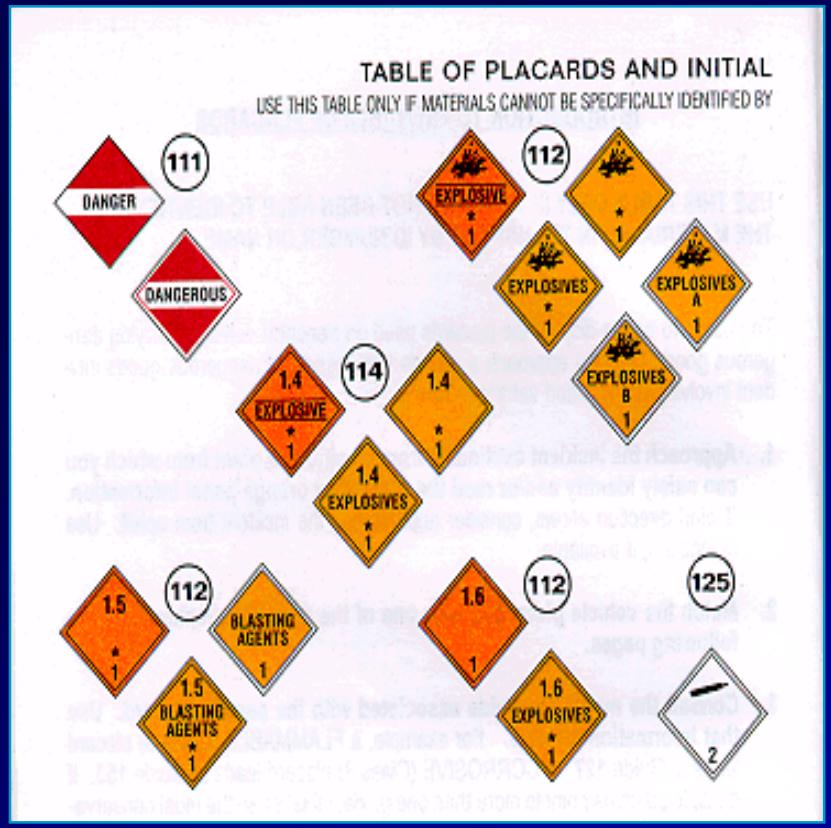
Page 1

- Explanation in detail of how to use the Guidebook to manage a hazardous materials response.
- Overview information on the exact nature of the ERG, it's intended application and limitations
- Summary of ERG content
- Contact information for assistance

Hazards and Placards

- **Page 14: Hazard Classification System**
  - Class 1: Explosives
  - Class 2: Gases
  - Class 3: Flammable and Combustible Liquids
  - Class 4: Flammable Solids
  - Class 5: Oxidizers and Organic Peroxides
  - Class 6: Toxic and Infectious Substances
  - Class 7: Radioactive Materials
  - Class 8: Corrosive Materials
  - Class 9: Miscellaneous Hazards

- **Page 16-17**



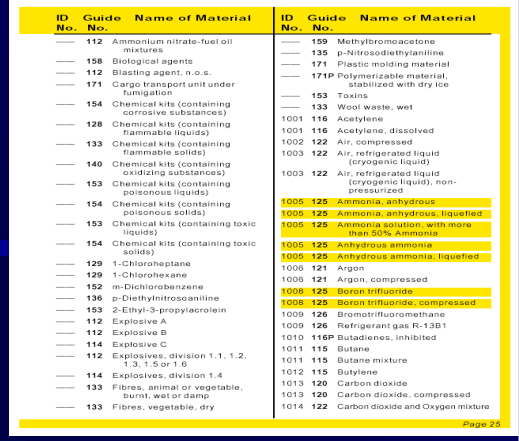
ID Codes on Intermodal Containers

- Page 20-23
  - Top number: Hazard Identification Code
    - indicates type of hazard
    - single number will be followed by a zero (*e.g.* 50)
    - double number means greater risk
    - "X" means will react with water
  - Bottom number
    - UN ID number

DOT

UN

YELLOW Section



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1005	125	Ammonia, anhydrous
1005	125	Ammonia, anhydrous, liquefied
1005	125	Ammonia solution, with more than 50% Ammonia
1005	125	Anhydrous ammonia
1005	125	Anhydrous ammonia, liquefied
1006	121	Argon
1006	121	Argon, compressed
1008	125	Boron trifluoride
1008	125	Boron trifluoride, compressed
1009	126	Bromotrifluoromethane
1009	126	Refrigerant gas R-13B1
1010	116P	Butadienes, inhibited
1011	115	Butane
1011	115	Butane mixture
1012	115	Butylene
1013	120	Carbon dioxide
1013	120	Carbon dioxide, compressed
1014	122	Carbon dioxide and Oxygen mixture

Page 25

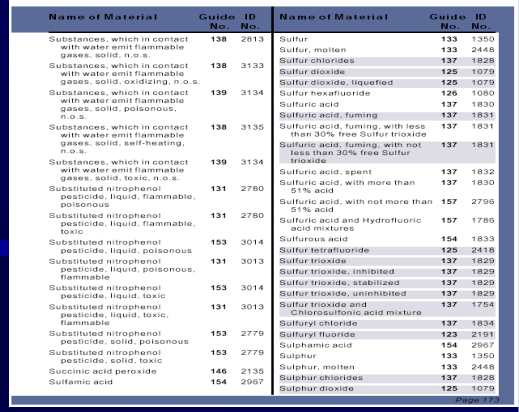
Index of dangerous goods in
Numerical order of the
4-digit ID number

Example

ID No.	Guide No.	Name of Material
1090	127	Acetone

International
BIOLOGICAL THREAT REDUCTION

BLUE Section



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Substances, which in contact with water emit flammable gases, solid, oxidizing, n.o.s.	138	3133
Substances, which in contact with water emit flammable gases, solid, poisonous, n.o.s.	139	3134
Substances, which in contact with water emit flammable gases, solid, self-heating, n.o.s.	138	3135
Substances, which in contact with water emit flammable gases, solid, toxic, n.o.s.	139	3134
Substituted nitrophenol pesticide, liquid, flammable, poisonous	131	2780
Substituted nitrophenol pesticide, liquid, flammable, toxic	131	2780
Substituted nitrophenol pesticide, liquid, poisonous	153	3014
Substituted nitrophenol pesticide, liquid, poisonous, flammable	131	3013
Substituted nitrophenol pesticide, liquid, toxic	153	3014
Substituted nitrophenol pesticide, liquid, toxic, flammable	131	3013
Substituted nitrophenol pesticide, solid, poisonous	153	2779
Substituted nitrophenol pesticide, solid, toxic	153	2779
Succinic acid peroxide	146	2135
Sulfamic acid	154	2967
Sulfur	133	1350
Sulfur, molten	133	2448
Sulfur chlorides	137	1828
Sulfur dioxide	125	1079
Sulfur dioxide, liquefied	125	1079
Sulfur hexafluoride	126	1080
Sulfuric acid	137	1830
Sulfuric acid, fuming	137	1831
Sulfuric acid, fuming, with less than 30% free Sulfur trioxide	137	1831
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Sulfuric acid, spent	137	1832
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Sulfuric acid, with not more than 51% acid	157	2796
Sulfuric acid and Hydrofluoric acid mixtures	157	1786
Sulfurous acid	154	1833
Sulfur tetrafluoride	125	2418
Sulfur trioxide	137	1829
Sulfur trioxide, inhibited	137	1829
Sulfur trioxide, stabilized	137	1829
Sulfur trioxide, uninhibited	137	1829
Sulfur trioxide and Chlorosulfonic acid mixture	137	1754
Sulfuryl chloride	137	1834
Sulfuryl fluoride	123	2191
Sulphamic acid	154	2967
Sulphur	133	1350
Sulphur, molten	133	2448
Sulphur chlorides	137	1828
Sulphur dioxide	125	1079

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Index of dangerous goods in Alphabetical order of the Material Name

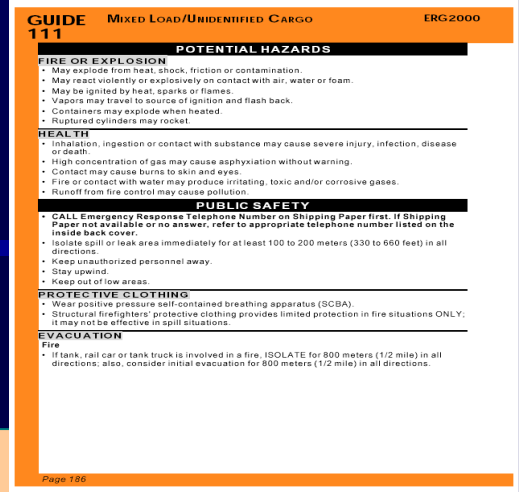
Example

Name of Material	Guide No.	ID No.
Sulfuric Acid	137	1830

BLUE Section

Name of Material	Guide No.	ID No.
Accumulators, pressurized pneumatic or hydraulic	126	1956
Acetal	127	1088
Acetaldehyde	129	1089
Acetadehyde ammonia	171	1841
Acetaldehyde oxime	129	2332
Acetic acid, glacial	132	2789
Acetic acid, solution, more than 10% but not more than 80% acid	153	2790
Acetic acid, solution, more than 80% acid	132	2789
Acetylene tetrabromide	159	2504
Acetyl iodide	156	1898
Acetyl methyl carbinol	127	2621
Acetyl peroxide	148	2084
Acid, liquid, n.o.s.	154	1760
Acid, sludge	153	1906
Acid butyl phosphate	153	1718
Acridine	153	2713
Acrolein, inhibited	131P	1092
Acrolein dimer, stabilized	129P	2607

ORANGE Section



GUIDE 111 MIXED LOAD/UNIDENTIFIED CARGO ERG2000

POTENTIAL HAZARDS

FIRE OR EXPLOSION
- May explode from heat, shock, friction or contamination.
- May react violently or explosively on contact with air, water or foam.
- May be ignited by heat, sparks or flames.
- Vapors may travel to source of ignition and flash back.
- Containers may explode when heated.
- Ruptured cylinders may rocket.

HEALTH
- Inhalation, ingestion or contact with substance may cause severe injury, infection, disease or death.
- High concentration of gas may cause asphyxiation without warning.
- Contact may cause burns to skin and eyes.
- Fire or contact with water may produce irritating, toxic and/or corrosive gases.
- Runoff from fire control 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.**
- Isolate spill or leak area immediately for at least 100 to 200 meters (330 to 660 feet) in all directions.
- Keep unauthorized personnel away.
- Stay upwind.
- Keep out of low areas.

PROTECTIVE CLOTHING
- Wear positive pressure self-contained breathing apparatus (SCBA).
- Structural firefighters' protective clothing provides limited protection in fire situations ONLY; it may not be effective in spill situations.

EVACUATION

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.

Page 186

62 individual guides in a two page format

Each guide is for a group of materials with similar chemical and toxicological characteristics

Left page: SAFETY information
Right page: EMERGENCY RESPONSE guidelines

Example
Guide 124 – Gases, toxic and / or corrosive - oxidizing

International
BIOLOGICAL THREAT REDUCTION

GREEN Section

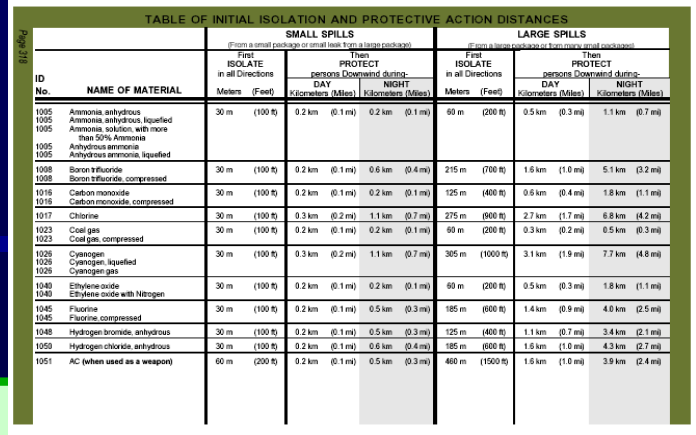


TABLE OF INITIAL ISOLATION AND PROTECTIVE ACTION DISTANCES

ID No.	NAME OF MATERIAL	SMALL SPILLS (From a small package or small leak from a large package) First ISOLATE in all Directions Meters	(Feet)	Then PROTECT persons Downwind during- DAY Kilometers	(Miles)	NIGHT Kilometers	(Miles)	LARGE SPILLS (From a large package or from many small packages) First ISOLATE in all Directions Meters	(Feet)	Then PROTECT persons Downwind during- DAY Kilometers	(Miles)	NIGHT Kilometers	(Miles)
1005 1005 1005 1005 1005	Ammonia, anhydrous Ammonia, anhydrous, liquefied Ammonia, solution, with more than 50% Ammonia Anhydrous ammonia Anhydrous ammonia, liquefied	30 m	(100 ft)	0.2 km	(0.1 mi)	0.2 km	(0.1 mi)	60 m	(200 ft)	0.5 km	(0.3 mi)	1.1 km	(0.7 mi)
1008 1008	Boron trifluoride Boron trifluoride, compressed	30 m	(100 ft)	0.2 km	(0.1 mi)	0.6 km	(0.4 mi)	215 m	(700 ft)	1.6 km	(1.0 mi)	5.1 km	(3.2 mi)
1016 1016	Carbon monoxide Carbon monoxide, compressed	30 m	(100 ft)	0.2 km	(0.1 mi)	0.2 km	(0.1 mi)	125 m	(400 ft)	0.6 km	(0.4 mi)	1.8 km	(1.1 mi)
1017	Chlorine	30 m	(100 ft)	0.3 km	(0.2 mi)	1.1 km	(0.7 mi)	275 m	(900 ft)	2.7 km	(1.7 mi)	6.8 km	(4.2 mi)
1023 1023	Coal gas Coal gas, compressed	30 m	(100 ft)	0.2 km	(0.1 mi)	0.2 km	(0.1 mi)	60 m	(200 ft)	0.3 km	(0.2 mi)	0.5 km	(0.3 mi)
1026 1026 1026	Cyanogen Cyanogen, liquefied Cyanogen gas	30 m	(100 ft)	0.3 km	(0.2 mi)	1.1 km	(0.7 mi)	305 m	(1000 ft)	3.1 km	(1.9 mi)	7.7 km	(4.8 mi)
1040 1040	Ethylene oxide Ethylene oxide with Nitrogen	30 m	(100 ft)	0.2 km	(0.1 mi)	0.2 km	(0.1 mi)	60 m	(200 ft)	0.5 km	(0.3 mi)	1.8 km	(1.1 mi)
1045 1045	Fluorine Fluorine, compressed	30 m	(100 ft)	0.2 km	(0.1 mi)	0.5 km	(0.3 mi)	185 m	(600 ft)	1.4 km	(0.9 mi)	4.0 km	(2.5 mi)
1048	Hydrogen bromide, anhydrous	30 m	(100 ft)	0.2 km	(0.1 mi)	0.5 km	(0.3 mi)	125 m	(400 ft)	1.1 km	(0.7 mi)	3.4 km	(2.1 mi)
1050	Hydrogen chloride, anhydrous	30 m	(100 ft)	0.2 km	(0.1 mi)	0.6 km	(0.4 mi)	185 m	(600 ft)	1.6 km	(1.0 mi)	4.3 km	(2.7 mi)
1051	AC **(when used as a weapon)**	60 m	(200 ft)	0.2 km	(0.1 mi)	0.5 km	(0.3 mi)	460 m	(1500 ft)	1.6 km	(1.0 mi)	3.9 km	(2.4 mi)

Index of TIH materials

(Toxic Inhalation Hazards)

Provides distances for

initial isolation and protective action

For small and large spills,

day or night

International

BIOLOGICAL THREAT REDUCTION

What is a “TIH” Material?

- **Toxic Inhalation Hazard (TIH)**
  - Has LC_{50} < 5,000 PPM, *or*
  - Adequate data does not exist
- **TIH zones**
  - A to D
  - **A** is most toxic -- LC_{50} < 200 PPM
  - **D** is least toxic

GREEN Section

ID No.	NAME OF Material	SMALL SPILLS (From a small package or small leak from large package) First ISOLATE in all Directions Meters (Feet)	SMALL SPILLS Then PROTECT persons Downwind during- DAY Kilometers (Miles)	SMALL SPILLS Then PROTECT persons Downwind during- NIGHT Kilometers (Miles)	LARGE SPILLS (From a large package or from many small packages) First ISOLATE in all Directions Meters (Feet)	LARGE SPILLS Then PROTECT persons Downwind during- DAY Kilometers (Miles)	LARGE SPILLS Then PROTECT persons Downwind during- NIGHT Kilometers (Miles)
1005 1005	Ammonia, anhydrous Ammonia, anhydrous, liquefied	30 m (100ft)	0.2 km (0.1 mi)	0.2 km (0.1 mi)	60 m (200 ft)	0.5 km (0.3 mi)	1.1 km (0.7 mi)
1005	Ammonia solution, with more than 50% Ammonia	30 m (100ft)	0.2 km (0.1 mi)	0.2 km (0.1 mi)	60 m (200 ft)	0.5 km (0.3 mi)	1.1 km (0.7 mi)
1008 1008	Boron trifluoride Boron trifluoride, compressed	30 m (200 ft)	0.2 km (0.1 mi)	0.6 km (0.4 mi)	215 m (700 ft)	1.6 km (1 mi)	5.1 km (3.2 mi)
1016 1016	Carbon monoxide Carbon monoxide, compressed	30 m (100ft)	0.2 km (0.1 mi)	0.2 km (0.1 mi)	125 m (400 ft)	0.6 km (0.4 mi)	1.8 km (1.1 mi)
1017	Chlorine	30 m (100 ft)	0.3 km (0.2 mi)	1.1 km (0.7 mi)	275 m (900 ft)	2.7 km (1.7 mi)	6.8 km (4.2 mi)

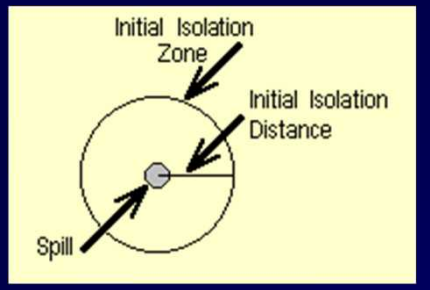
DOWNWIND HAZARD PREDICTIONS (cont.)

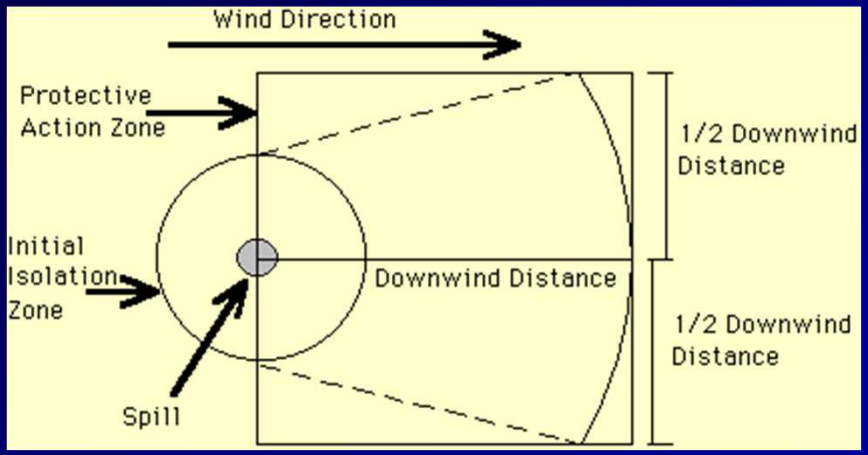
Step 3:

Draw circle with radius of isolation distance

Mark the wind direction

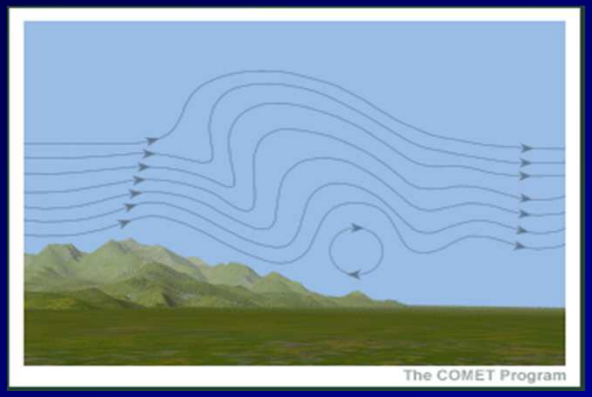
Draw a box the size of protection distance, place upwind edge over center of circle towards downwind direction





DOWNWIND PREDICTION FACTORS

- **Factors**
  - Weather
  - Agent
  - Environment
  - Dissemination influences
- **Problems**
  - Unknown micro weather
  - Uncertain of the quantity/purity
  - Building/terrain effect not modeled well
  - Unknown dissemination parameters



How to use the ERG

- Locate placard or shipping papers
- Identify the material
  - 4-digit ID number
  - Name of material
- If unable to identify, go to GUIDE 111
  - Mixed Load
  - Unidentified Cargo
- Look for a "P" in the guide # 127 P
  - Material may polymerize
  - Container may fail violently
  - Use extreme caution
- Look for highlighting
  - indicates TIH or water reactive
  - Go to GREEN section
  - Take initial isolation and downwind protection steps IMMEDIATELY!


SECS 860 833 7
2015
2015
5.1
CORROSIVE
eurotainer
CORROSIVE
2015
5.1
ZCSU 500327 6
US 4332
MAX GR
TARE
NET
CU.CAP

DOWNWIND HAZARD PREDICTIONS

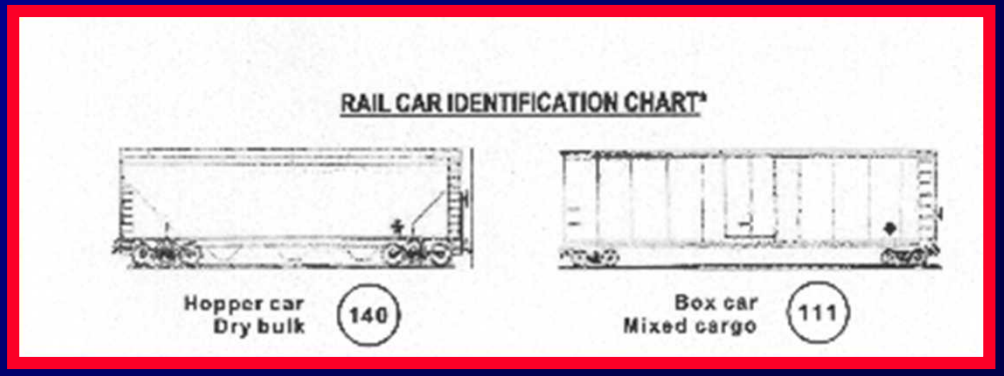
Step 1: Identify the hazard

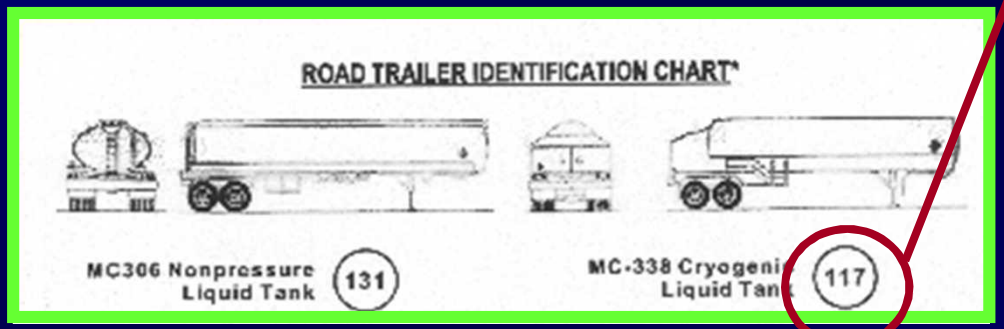
Step 2: Determine isolation and protection distances (green pages)

Using the Placard Table

- Use only when the ID number or the name is not available
- Continue to seek more reliable information
- Use the ORANGE Guide for the specific material as soon as possible

As a last resort for identification





- Locate the rail car and road trailer ID charts on page 18 or 19
- Turn to the appropriate ORANGE guide number
- Follow the directions listed in the guide

Activity: Using the 2004 Emergency Response Guide

- **Identify the:**
  - **Hazard**
  - **Hazard class**
  - **3-digit ORANGE Guide Number**
  - **Other information**

1380

International
BIOLOGICAL THREAT REDUCTION

Pentaborane

CAS RN: 19624-22-7

Protective Distance

IF THERE IS A FIRE, or IF A FIRE IS INVOLVED, go directly to the ERG guide page and use the evacuation information shown under PUBLIC SAFETY.

Initial Isolation and Protective Action Distances							
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 many small packages)		
		First ISOLATE in all Directions	Then PROTECT persons Downwind during		First ISOLATE in all Directions	Then PROTECT persons Downwind during	
			Day	Night		Day	Night
1380	Pentaborane	90 m 300 ft	0.9 km 0.6 mi	3.3 km 2.1 mi	600 m 1800 ft	5.3 km 3.3 mi	11 km 6.9 mi


2067
5.1
PEI
1993
2
1.5
BLASTING
AGENTS
D
1
2067
5.1
DRIVE
SAFELY

Thank You!

Paula Austin
International Biological Threat Reduction
paustin@sandia.gov

www.biosecurity.sandia.gov

International
BIOLOGICAL THREAT REDUCTION

What's new in the ERG?

- **2004**
  - 26 additional pages
  - Instructions to call 911
  - Criminal / terrorist biochem agents
  - Additional placards
  - Railcar and trailer identification charts
  - Intermodal container hazard ID codes
  - Updated isolation distances
- **2008**
  - Pipeline information
  - E85
  - Amendments on shipping names and numbers