Understanding Hazardous Materials and Hazard Classification
Hazmat definition

- Substance or material
- Transported in commerce
- Determined to pose unreasonable risk to health, safety and property
Hazmat definition

- Hazardous substances
- Hazardous wastes
- Marine pollutants
Hazmat definition

- Elevated temperature materials
- Materials designated hazardous in 172.101
- Materials meeting defining criteria in Part 173
Hazardous substances

- Includes mixtures and solutions
- Listed in Appendix A of HMT
- Equals or exceeds the RQ in Appendix A
Hazardous substances

- Concentration by weight equals or exceeds concentration corresponding to its RQ

- Radionuclides conform to Paragraph 7 of Appendix A
Hazardous waste

- Subject to the hazardous waste manifest requirements of EPA
- 40 CFR Part 262
Marine pollutants

- Listed in Appendix B of HMT

- Solution or mixture equals or exceeds 10 percent by weight

- Severe marine pollutant solution or mixture equals or exceeds 1 percent by weight
Elevated temperature material

- Liquid phase at or above 100 degrees C (212 degrees F)

- Liquid phase with flash point at or above 37.8 degrees C (100 degrees F)
Elevated temperature material

- Solid phase at or above 240 degrees C (464 degrees F)
Hazard classes

- Class 1 – Explosives
- Class 2 – Gases
- Class 3 – Flammable or Combustible liquid
Hazard classes

- Class 4 – Flammable solid
- Class 5 – Oxidizer or Organic peroxide
- Class 6 – Poison
Hazard classes

- Class 7 – Radioactive
- Class 8 – Corrosive
- Class 9 – Miscellaneous
Class 1 Explosives

1.1 Mass explosion hazard

1.2 Projection hazard

1.3 Fire hazard
Class 1 Explosives

- 1.4 No significant blast hazard
- 1.5 Blasting agents
- 1.6 Detonating substances
Class 2 Gases

- 2.1 Flammable gas
- 2.2 Non-flammable gas
- 2.3 Poison gas
Precedence list

1. Class 7
2. Division 2.3
3. Division 2.1
4. Division 2.2
Precendence list

5. Division 6.1, PG I, PIH only

6. Division 4.2 (Pyrophoric)

7. Division 4.1 (Self-reactive)
Precedence list

8. Class 3, Class 8, Division 4.1, Division 4.2, Division 4.3, Division 5.1, Division 6.1

9. Combustible liquids

10. Class 9
Criteria
Class 1 (Explosives)

- Substance or article
- Includes a device
- Functions by explosion or chemical reaction
Criteria
Class 1 (Explosives)

- Six divisions –
  - 1.1 – Mass explosion hazard – affects entire load instantaneously
  - 1.2 – Projection hazard – not mass explosion hazard
  - 1.3 – Fire hazard & minor blast/projection hazard
Criteria
Class 1 (Explosives)

- 1.4 -- Minor explosion hazard confined to package

- 1.5 – Insensitive explosives – mass explosion hazard

- 1.6 – Extremely insensitive explosives – no mass explosion hazard
Class 2 (Gases)

- Three divisions

  2.1 – Flammable gas - Gas at 20 degrees C (68 degrees F) or less
  - - 101.3 kPa (14.7 psi) of pressure
  - - Is ignitable at 101.3 kPa (14.7 psi) when in a mixture of 13 percent or less by volume with air
  - - Has a flammable range at 101.3 kPa (14.7 psi) with air of at least 12 percent
Class 2 (Gases)

2.2 – Non-flammable gas - In packaging exerts absolute pressure of 280 kPa (41 psia) or greater at 20 degrees C (68 degrees F)

- Does not meet the definition of 2.1 and 2.3
Class 2 (Gases)

2.3 – Poison gas - Gas at 20 degrees C (68 degrees) or less
- Pressure of 101.3kPa (14.7 psi)
- Poses a health hazard to humans in transportation
- Presumed to be toxic to humans
Divisions defined by

- Non-liquefied compressed gas – in a packaging is entirely gaseous at 20 degrees C (68 degrees F)

- Liquefied compressed gas - partially liquid in a packaging at 20 degrees C (68 degrees F)
Divisions defined by

- Compressed gas - in solution is non-liquefied compressed gas dissolved in solvent

- Cryogenic liquid – refrigerated liquefied gas with boiling point below -90 degrees C (-130 degrees F)
Refrigerant gas

All non-poisonous refrigerant or dispersant gases and mixtures listed in 172.101, 173.304, 173.314, and 173.315
Flammable range

- Difference between minimum and maximum volume percentages of the material in air that form a flammable mixture
Class 3 (Flammable liquid)

- Liquid having flash point not more than 60 degrees C (140 degrees F)
Class 3 (Flammable liquid)

- Any material in a liquid phase with flashpoint at or above 37.8 degrees C (100 degrees F) intentionally heated and transported at or above its flashpoint.
Exceptions

- Any liquid meeting one of the definitions of a Class 2

- Any mixture having a component with a flash point of 60 degrees C (140 degrees F) or higher, that makes up at least 99 percent of the total volume, and not transported above its flash point
Exceptions

- Any liquid with a flash point greater than 35 degrees C (95 degrees F) that does not sustain combustion

- Any liquid with a flash point greater than 35 degrees C (95 degrees F) and a fire point greater than 100 degrees C (212 degrees F)
Exceptions

- Any liquid with a flash point greater than 35 degrees C (95 degrees F) in a water-miscible solution with water content of more than 90 percent
Combustible liquid

- Any liquid not meeting definition of any other hazard class

- Flash point above 60 degrees C (140 degrees F) and below 93 degrees C (200 degrees F)
Combustible liquid

- A flammable liquid with a flash point above 38 degrees C (100 degrees F) may be reclassified combustible
Class 4 (Flammable solid)

- Three divisions

- 4.1 (Flammable solid)
  - Desensitized explosives
  - Self-reactive materials
  - Readily combustible solids
Class 4 (Flammable solid)

- 4.2 (Spontaneously combustible)
  - Pyrophoric materials
  - Self-heating materials
Class 4 (Flammable solid)

4.3 (Dangerous when wet)

- When in contact with water –
- Is liable to become spontaneously flammable
- Gives off flammable or toxic gas
Class 5 (Oxidizers and Organic peroxide)

- Two divisions

- 5.1 (Oxidizer)
  - Causes or enhances combustion by yielding oxygen
Class 5 (Oxidizers and Organic peroxide)

- 5.2 (Organic peroxide)
  - Contains oxygen
  - May be considered a hydrogen peroxide derivative
Class 6 (Poison)

- Two divisions
- 6.1 (Poison)
  - Presumed toxic to humans
  - Health hazard during transport
  - Extreme irritation similar to tear gas
Class 6 (Poison)

6.2 (Infectious substance)

- Viable microorganism or its toxin
- May cause disease in humans or animals
Class 7 (Radioactive)

- Specific gravity greater than 0.002 microcuries per gram
Class 8 (Corrosive)

- Causes full thickness destruction of human skin

- Severe corrosion rate on steel or aluminum
Class 9 (Miscellaneous)

- Hazmat that does not meet definition of any other hazard class
ORM-D (Other regulated materials)

- Consumer commodity
- Limited hazard in transport
- Must have exceptions in HMT
Limited quantities exceptions

- Exceptions
  - Listed by class in Part 173 of HMR
Limited quantity

- Maximum amount of hazmat that has a specific labeling or packaging exception
Limited quantities (most hazmat)

- Excepted from labeling requirements
- Excepted from specification packaging requirements
- Excepted from placarding requirements
Limited quantities (most hazmat)

- Must meet Subpart B packaging requirements
- May not exceed 30 kg (66 lbs) gross weight each package
Limited quantities (Compressed gases)

- Reference 173.306 in the HMT
- Excepted from labeling unless specified
- Excepted from specification packaging unless specified
Limited quantities (Compressed gases)

- Excepted from placarding requirements

- Excepted from Part 177 requirements, except shipping paper requirements (177.817)

- May not exceed 30 kg (66 lbs) gross weight each package
Additional limited quantities

- Addressed in 173.306
Limited quantities (Radioactive)

- Material package limits specified and conforming with 173.421 - .425
ORM-Ds

- Consumer commodity

- Material packaged and distributed in a form suitable for retail sales

- Includes drugs and/or medicines
ORM-Ds

- Limited quantity may be renamed consumer commodity
- Same exceptions as limited quantities
- Listed by class in Part 173 of HMR
Other exceptions
Class 3 (Flammable)

- Alcoholic beverages - 173.150(d)
- Aqueous solutions of alcohol - 173.150(e)
- Combustible liquids – 173.150(f)
Other exceptions
Class 8 (Corrosive)

- Corrosive to aluminum and/or steel – 173.154(d)