Oceanside Fire Department

Community Risk Reduction
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Completion of the Chemical Classification Packet

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PURPOSE

This guideline was developed to assist businesses in complying with the provisions of Chapter 50 of the 2019 California Fire Code (CFC). It is applicable to any business storing, using, or handling hazardous materials. Hazardous materials are chemicals that pose a physical hazard (like fire or explosion) or a health hazard (like toxic or corrosive). This guide treats hazardous waste as a hazardous material. This Chemical Classification Packet meets the requirements of the HMIS (Hazardous Materials Inventory Statement) in the CFC.

SCOPE

All chemicals need to be classified with respect to their individual hazards, so a determination can be made relative to the Maximum Allowable Quantity (MAQ). This will allow the proper fire and life safety protection systems to be in place. OFD will perform a MAQ review taking into account: controls areas, open vs. closed use, and indoor vs. outside storage.

SUBMITTAL REQUIREMENTS

Attached are sample chemical classification forms, an explanation of the fields requiring completion, and a list of hazard classes as defined by the 2019 CFC. This packet should be used to classify all chemicals stored, used, or handled at your facility *regardless of the quantities of each chemical.* The following three separate lists require completion for each Chemical Classification Packet:

1. Chemical Classification Form (shows entire inventory)
2. Chemical Classification Summary Sheet (shows totals by hazard class)
3. Chemical Classification Summary Totals (shows totals by area)

Safety Data Sheets (SDS/MSDS) may be submitted along with the contact information from the preparer of the chemical information. A basic floor plan drawing of the facility is required to show chemical storage and use locations, and any special control areas.

MIXTURES

Classifying the hazards of mixtures can be complicated, especially if the individual components themselves have multiple hazards. Dilution almost always lessens the hazard of the pure chemical. Information listed on the SDS/MSDS may not be specific to the diluted mixture. Sometimes they list data from one of the most hazardous components instead. OFD will make the final determination of the most appropriate hazard class.

If there is any question as to the accuracy or completeness of the information provided, you will be required to make corrections and resubmit your Chemical Classification Packet. A third-party technical or engineering report may be required if your chemical information cannot be verified.

FORMS

Use the three sample forms in completing your own documents and assure all fields are completed. Provide the name of the facility, address, and area addressed by the packet, if applicable, on each page of the Chemical Classification Packet. Use only the definitions provided to classify your chemicals into all applicable categories. Incomplete or incorrect forms may be returned.

1. Chemical Classification Form - Sample #1 in this document shows a list of all the chemicals used at a sample facility (a blank version of this form has been included at the end of this guideline for your information). Examples of chemicals have been provided with all fields completed.

   Note: Chemicals that have the same components and hazard classes may be grouped together. For example, if 10 gallons of blue paint and 20 gallons of red paint have the same basic components, they can be listed as 30 gallons of paint. In addition, all items such as motor oil, hydraulic fluid, antifreeze, waste motor oil, etc. are all classified as Class IIIB Combustible Liquids and can be grouped together under the heading, CL-IIIB Liquids. Conversely, if you have several containers of isopropyl alcohol at different concentrations, list these separately as they may be classified differently based on the individual flash points.

   The following list explains the information required in each field:

COMMON NAME	CHEMICAL NAME	% COMP	CAS #	FORM	QUANT. STORED	QUANT. IN USE (Open/Closed)	LOCATION (Storage & Use)	HAZ CLASSES	JUSTIFICATION

   A. Common Name: This is the name of the chemical as it is used in your industry. Sometimes it will be a trade name, such as Purple K®, WD40, Techron, muriatic pool acid, or "Safety Kleen."
   B. Chemical Name and %: This is the technical name for the *pure* chemical. If the chemical is a mixture, list the components of the mixture *with their composition percentage*. If it is a pure chemical, list the percent concentration as 100%. If the product is a water solution, list the percent concentration.
   C. CAS Number: The Chemical Abstract Service number can usually be found on the SDS/MSDS or from the chemical supplier.
   D. Form of a product: The form of a product is: solid, liquid, gas, or aerosol. Solids shall be reported in pounds, liquids in gallons, and gases in cubic feet. Liquefied petroleum gas (LPG) and cryogenic liquids are treated as liquids and reported in gallons. Aerosols shall be reported in pounds. For example, if some of the components in an aerosol make it toxic or corrosive, then that aerosol amount must also be included in the summary table for those hazard classes, in gallons.
   E. Quantity Stored: Total amount within *closed* containers in the building or area.
   F. Quantity in Use: The amount in use in the process/dispensing area(s) of the building. Also, indicate whether the amount in use is in an open or closed system.
   G. Location: In a cabinet, QC lab, high-piled rack system, outside tank, etc.

H. Hazard Classes: There are often several hazards for each chemical (classifications may be abbreviated in Attachment 1). All hazard classifications for the chemical must be listed. Carcinogens, Irritants, Other Health Hazards, Radioactive, and Sensitizers, are no longer regulated by the Fire Code; there is no need to show the totals for these chemicals (see Sample #3).

I. Justification: This column can be used to indicate where you obtained the information for the classification of the material. For example, if you classified a chemical as toxic, provide the LD_{50} data, likewise for corrosives and flammables the pH or the flash point data.

2. Chemical Classification Summary Sheet - Sample #2 shows a list of the chemicals from the sample Chemical Classification Form. To develop this sheet, reorganize the information from the Chemical Classification Form and sort the information by hazard class. The following is a list of the required information:

Chemical Name	Amount Stored	Open Use	Closed Use	Location of Storage	Location of Use

- Chemical Name
- Amount Stored
- Open System Use Amount
- Closed System Use Amount
- Location of Storage
- Location of Use
- Totals for Interior Storage
- Totals for Exterior Storage
- Totals for Open System Use
- Totals for Closed System

NOTE: Chemicals with multiple hazards are listed under each hazard classification (example is concentrated sulfuric acid is corrosive, toxic, and class 1 water-reactive).

3. Chemical Classification Summary Totals - Sample #3 shows a list of the totals by hazard classification for a given building and/or area. The following is a list of required information for each hazard class and an example of a completed section of the summary:
   A. Hazard Class
   B. Total amount stored or used inside the building
   C. Total amount stored or used outside the building
   D. Total amount used in open systems
   E. Total amount used in closed systems

SAMPLE:

FL-IB:

Interior Storage:	20 gal
Exterior Storage:	55 gal
Open System Use:	
Closed System	

CL-II:

Interior Storage:	
Exterior Storage:	110 gal
Open System Use:	
Closed System Use:	

4. Reference Books - The following reference materials may be useful in the classification of hazardous substances at your facility:
    A. *The Merck Index*, 10th ed., Merck & Co. Inc., Rahway, New Jersey 07065 (1983)
    B. Sittig, Marshall, *Handbook of Toxic and Hazardous Chemicals and Carcinogens*, Noyes Publications, Mill Road, Park Ridge, New Jersey 07856
    C. Lewis, Sr., Richard J., *Sax's Dangerous Properties of Industrial Materials*, 8th ed., Van Nostrand Reinhold Publications, 115 Fifth Avenue, New York, New York 10003
    D. *Handbook of Compressed Gases*, Compressed Gas Association Inc., 1235 Jefferson Davis Highway, Arlington, Virginia 22202
    E. *Fire Protection Guide to Hazardous Materials*, 10th ed., National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101 Quincy, Massachusetts 02269
    F. Fluer, Larry, *Hazardous Materials Classification Guide*, International Fire Code Institute, 5360 Workman Mill Road, Whittier, California, 90601
    G. *Genium's Handbook of Safety, Health, and Environmental Data for Common Hazardous Substances*

HAZMAT IDENTIFICATION – NFPA 704 Placard (or Diamond)

The primary purpose of identifying hazardous materials is to provide basic information to first responders and emergency personnel during a fire, spill, or leak. The NFPA diamond is a system of markings that identifies the hazards of a material in terms of three principal categories:

(1) Health - blue
(2) Flammability – red
(3) Instability – yellow
(4) Special Hazard - white

This system shall indicate the degree of severity by a numerical rating from 4 (severe hazard) down to 0 (minimal hazard). The white quadrant is used for special hazards like Water Reactive chemicals. For example:

- Flammable gases, pyrophoric, and FL-IA are assigned a 4 Red.
- Flammable solids and FL-IB are assigned a 3 Red,
- CL-II and CL-IIIA are assigned a 2 Red.

MSDS or SDS information can be used to assign each rating. The NFPA diamond is to be placed on each tank or drum.

When determining the most appropriate diamond placard for a building or room, NFPA

suggests four different methods, with the fifth method being a combination of the first two.

1. Placard for the highest single hazard chemical
2. Placard for the largest quantity of any one chemical
3. Multiple placards, to account for more than one chemical
4. Worst case placard, that depicts the highest hazard in each category for all of the chemicals
5. Weighted average of each chemical quantity in its hazard category

NOTE: For some areas in a plant or facility, the use of the actual chemical name is very common. OFD encourages each facility to use specific chemical information to enhance safety.

CHEMICAL CLASSIFICATION FORM (SAMPLE #1)

COMMON NAME	CHEMICAL NAME	% Comp	CAS #	FORM	QUANT. STORED	QUANT. IN USE (Open/ Closed)	LOCATION (Storage & Use)	HAZ. CLASSES	JUSTIFICATION
Acetic Acid	Acetic Acid, Glacial	100	64-19-7	L	15 gal	5 gal, Ope	Stor: Flam Cab Use: Wet	CL-II, COR, OHH	Sax's Manual, pH is 12.5
Acetone	Acetone	100	67-64-1	L	55 gal	10 gal, Open System	Stor: Exter Stor Use: H-2	FL-IB, IRR, OHH	Merck Index, flash pt is 60F
Acetylene, Compressed	Acetylene	100	74-86-2	G	200 cf	200 cf, Close d	Stor: Weld Shop Use: Weld Shop	FLG, URG	OFD Top 100 list
Benzene	Benzene	100	74-13-2	L	5 gal	1 gal, Open System	Stor: Flam Cab Use	FL-IB, OHH, IRR, CAR	Genium's handbook
Formaldehyde with Methanol	Formaldehyde Methanol Water	37 15 48	50-00-0 67-56-1 7732-18-5	L	110 gal	55 gal, Open System	Stor: Exter Stor Use: H2 Room	CL-II, TOX, SENS, CAR, IRR	MSDS – Flash pt = 140 deg F, Oral rat LD50 = 100 mg/kg, Irr. to skin, Carc. and Sens.
Hydrochloric Acid	Hydrochloric Acid Water	90 10	7647-01-0 7732-18-5	L	300 gal	55 gal, Closed System	Stor: Corr Stor Use: Wet Process	COR, OHH	Perry's Handbook, pH is 13
Isopropanol	Isopropyl Alcohol	100	67-63-0	L	15 gal	3 gal, Open System	Stor: Flam Cab Use: Lab	FL-IB, OHH, IRR	Fluer's Manual
Fuel Injector Cleaner	2 Butoxy ethanol Butane Pentane CO2	15 40 40 5	111-76-2 109-97-8 109-66-0 124-38-9	A	30 lb/3 gal		Stor: Lab Cab Use: Lab	AERO-3,OHH, TOX, IRR	MSDS
Nitric Acid	Nitric Acid Water	10 90	7697-37-2 7732-18-5	L	55 gal	10 gal, Open System	Stor: Corr Stor Use: Wet Process	OXY-1, COR	MSDS, pH = 12.5
Sodium Dichromate	Sodium Chromate	100	10588-01-9	S	50 lb	10 lb, Open System	Stor: H-4 Room Use: H-4	COR, HTOX, OXY-1 CAR, OHH	MSDS, LD50=25 mg/kg
Sulfuric Acid	Sulfuric Acid Water	94 6	7664-93-9 7732-18-5	L	55 gal	15 gal, Closed System	Stor: Corr Stor Use: Wet Process	COR, TOX, , WR-1, OHH	OFD Top 100 list

CHEMICAL CLASSIFICATION SUMMARY SHEET (SAMPLE #2)

Hazard Class: FL-IB

Chemical Name	Amount Stored	Open Use	Closed Use	Location of Storage	Location of Use
Acetone	55 gal	10 gal	0 gal	Exterior Storage	H-3 Room
Benzene	5 gal	1 gal	0 gal	Flammable Cabinet	Laboratory
Isopropyl Alcohol	15 gal	3 gal	0 gal	Flammable Cabinet	Laboratory

Interior Storage: 20 gal Exterior Storage: 55 gal Open Use: 14 gal Closed Use: 0 gal

Hazard Class: CL-II

Chemical Name	Amount Stored	Open Use	Closed Use	Location of Storage	Location of Use
Formaldehyde Mixture	110 gal	55 gal	0 gal	Exterior Storage	H-3 Room
Acetic Acid	15 gal	5 gal	0 gal	Flammable Cabinet	Wet Process

Interior Storage: 0 gal Exterior Storage: 110 gal Open Use: 60 gal Closed Use: 0 gal

Hazard Class: FLG

Chemical Name	Amount Stored	Open Use	Closed Use	Location of Storage	Location of Use
Acetylene	200 cf	0 cf	200 cf	Weld Shop	Weld Shop

Interior Storage: 200 cf Exterior Storage: 0 cf Open Use: 0 cf Closed Use: 200 cf

Hazard Class: OX-1

Chemical Name	Amount Stored	Open Use	Closed Use	Location of Storage	Location of Use
Sodium Chromate	50 lb	10 lb	0 lb	H-4 Room	H-4 Room
Nitric Acid	55 gal	10 gal	0 gal	COR Storage	Wet Process

Interior Storage: 55 gal, 50 lb Exterior Storage: 0 gal/0 lb Open Use: 10 gal/10 lb Closed Use: 0 gal/lb

Hazard Class: UR-1

Chemical Name	Amount Stored	OpenUse	Closed Use	Location of Storage	Location of Use
Acetylene	200 cf	0 cf	200 cf	Weld Shop	Weld Shop

Interior Storage: 200 cf Exterior Storage: 0 cf Open Use: 0 cf Closed Use: 200 cf

Company Name: _____ Page_____of_____

Company Address: _____ Area: _____

Hazard Class: WR-1

Chemical Name	Amount Stored	Open Use	Closed Use	Location of Storage	Location of Use
Sulfuric Acid	55 gal	0 gal	15 gal	COR Storage	Wet Process

Interior Storage: 55 gal Open Use: 0 gal Exterior Storage: 0 gal Closed Use: 15 gal

Hazard Class: HTOX

Chemical Name	Amount Stored	Open Use	Closed Use	Location of Storage	Location of Use
Sodium Chromate	50 lb	10 lb	0 lb	H-4 Room	H-4 Room

Interior Storage: 50 lb Exterior Storage: 0 lb Open Use: 10 lb Closed Use: 0 lb

Hazard Class: TOX

Chemical Name	Amount Stored	Open Use	Closed Use	Location of Storage	Location of Use
Formaldehyde Mixture	110 gal	55 gal	0 gal	Exterior Storage	H-3 Room
Sulfuric Acid	55 gal	0 gal	15 gal	COR Storage	Wet Process

Interior Storage: 55 gal Exterior Storage: 110 gal Open Use: 55 gal Closed Use: 15 gal

Hazard Class: COR

Chemical Name	Amount Stored	Open Use	Closed Use	Location of Storage	Location of Use
Acetic Acid	15 gal	5 gal	0 gal	Flammable Cabinet	Wet Process
Nitric Acid	55 gal	10 gal	0 gal	COR Storage	Wet Process
Sulfuric Acid	55 gal	0 gal	15 gal	COR Storage	Wet Process
Hydrochloric Acid	300 gal	0 gal	55 gal	COR Storage	Wet Process
Sodium Chromate	50 lb	20 lb	0 lb	H-4 Room	H-4 Room

Interior Storage: 425 gal/50 lb Exterior Storage: 0 gal/0 lb Open Use: 15 ga/20 lb Closed Use: 70 ga/0 lb

Company Name: _____ Page_____of_____

Company Address: _____ Area: _____

CHEMICAL CLASSIFICATION SUMMARY TOTALS (SAMPLE #3)

FL-IB:

Interior Storage:	20 gal
Exterior Storage:	55 gal
Open Use:	14 gal
Closed Use Use:	

CL-II:

Interior Storage:	
Exterior Storage:	110 gal
Open System Use:	60 gal
Closed System Use:	

FLG:

Interior Storage:	200 cf
Exterior Storage:	
Open Use:	
Closed Use Use:	200 cf

OXY-1:

Interior Storage:	55 gal, 50 lbs
Exterior Storage:	
Open System Use:	
Closed System Use:	10 gal, 10 lbs

WR-1

Interior Storage:	55 gal, 50 lbs
Exterior Storage:	
Open Use:	0 gal, 7 lbs
Closed Use Use:	15 gal, 0 lbs

UR-1

Interior Storage:	200 cf
Exterior Storage:	
Open System Use:	
Closed System Use:	200 cf

TOX:

Interior Storage:	55 gal
Exterior Storage:	110 gal
Open Use:	55 gal
Closed Use Use:	15 gal

HTOX:

Interior Storage:	50 lbs
Exterior Storage:	
Open System Use:	10 lbs
Closed System Use:	

COR:

Interior Storage:	425 gal, 50 lbs
Exterior Storage:	
Open Use:	15 gal, 20 lbs
Closed Use Use:	70 gal, 0 lbs

AERO-3:

Interior Storage:	30 lbs
Exterior Storage:	
Open System Use:	
Closed System Use:	

Company Name: _____ Page_____of_____

Company Address: _____ Area: _____

ATTACHMENT 1
FIRE CODE DEFINITIONS FOR HAZARDOUS MATERIALS
2019 Edition

EXPLOSIVES (EXP)
A chemical that causes a sudden, almost instantaneous release of pressure, gas and heat when subjected to sudden shock, pressure, or high temperatures; a material or chemical, other than blasting agent, that is commonly used or intended to be used for the purpose of producing an explosive effect.

COMPRESSED GASES (CG)
A material or mixture of materials that is a gas at 68°F or less at 14.7 psia of pressure and has a boiling point of 68°F or less at 14.7 psia, which is either liquefied, non-liquefied, or in solution (exception: those gases that have no other health or physical hazard properties are not considered to be compressed until the pressure in the packaging exceeds 41 psia at 68°F). The states of a compressed gas are categorized as follows:

1. Non-liquefied compressed gases are gases other than those in solution that are, in a packaging under the charged pressure, entirely gaseous at a temperature of 68°F.
2. Liquefied compressed gases are gases that, in a packaging under the charged pressure, are partially liquid at a temperature of 68°F.
3. Compressed gases in solution are non-liquefied gases that are dissolved in a solvent.
4. Compressed gas mixtures consist of a mixture of two or more compressed gases contained in a packaging, the hazard properties of which are represented by the properties of the mixture as a whole.

Corrosive Compressed Gas (Cor CG): A compressed gas that also meets the criteria for a corrosive material.

Highly Toxic Compressed Gas (HTox CG): A compressed gas that also meets the criteria for a highly toxic material.

Toxic Compressed Gas (Tox CG): A compressed gas that also meets the criteria for a toxic material.

Inert Compressed Gas (ICG): A compressed gas that exhibits no chemical activity, will not react with any other chemical, and is harmless to persons, animals, and the environment.

Oxidizing Compressed Gas (Ox CG): A compressed gas that initiates or promotes combustion in other materials, thereby causing fire either of itself or through the release of oxygen and/or other gases.

Flammable Compressed Gas (FLG): A material that is a gas at 68°F or less at 14.7 psia of pressure (the material has a boiling point of 68°F or less at 14.7 psia) that:

A. is ignitable at 14.7 psia when in a mixture of 13% or less by volume with air; ***or***

B. has a flammable range at 14.7 psia with air of at least 12%, regardless of the lower limit. The limits specified shall be determined at 14.7 psia of pressure and a temperature of 68°F (20°C) in accordance with nationally recognized standards.

Liquefied Petroleum Gas (LPG): A material that is composed predominantly of the following hydrocarbons or mixtures of them: propane, propylene, butane (normal butane or isobutane), and butylenes.

FLAMMABLE & COMBUSTIBLE LIQUIDS

Flammable Liquid: A liquid having a closed cup flash point below 100°F. Class I liquids shall include those having flash points below 100°F and are subdivided as shown below.

Combustible Liquid: A liquid having a flash point at or above 100°F. Combustible liquids are subdivided as shown below.

Classification of flammable and combustible liquids according to flash point:

Class IA (FL-IA): liquids with a flash point below 73°F and a boiling point below 100°F.

Class IB (FL-IB): liquids with a flash point below 73°F and a boiling point at or above 100°F.

Class IC (FL-IC): liquids with a flash point at or above 73°F and below 100°F.

Class II (CL-II): liquids with a flash point at or above 100°F and below 140°F.

Class IIIA (CL-IIIA): liquids with a flash point at or above 140°F and below 200°F.

Class IIIB (CL-IIIB): liquids with a flash point at or above 200°F.

FLAMMABLE SOLIDS (FLS)

A solid substance, other than one which is defined as a blasting agent or explosive, that is liable to cause fire through friction or as a result of retained heat from manufacture, which has an ignition temperature below 212°F, or which burns so vigorously or persistently when ignited that it creates a serious hazard. Flammable solids include solid materials that when dispersed in air as a cloud may be ignited and cause an explosion.

ORGANIC PEROXIDES (OP)

An organic compound that contains the bivalent -0-0- structure and which may be considered to be a structural derivative of hydrogen peroxide where one or both of the hydrogen atoms have been replaced by an organic radical. Organic peroxides can

present an explosive hazard (detonation or deflagration) or they can be shock-sensitive. They may also decompose into various unstable compounds over an extended period of time.

Classification of organic peroxides according to hazards:

Class I (OP-I): Class I peroxides are capable of deflagration, but not detonation. These peroxides present a high explosion hazard through rapid decomposition.

Class II (OP-II): Class II peroxides burn very rapidly and present a severe reactivity hazard.

Class III (OP-III): Class III peroxides burn rapidly and present a moderate reactivity hazard.

Class IV (OP-IV): Class IV peroxides burn in the same manner as ordinary combustibles, and present a minimum reactivity hazard.

Class V (OP-V): Class V peroxides do not burn or present a decomposition hazard.

OXIDIZER (OX)
A material other than a blasting agent or explosive that readily yields oxygen or other oxidizing gas or that readily reacts to promote or initiate combustion of combustible materials.

Classification of liquid and solid oxidizers according to hazard:

Class 4 (OX-4): An oxidizer that can undergo an explosive reaction due to contamination or exposure to thermal or physical shock. In addition, the oxidizer will enhance the burning rate and may cause spontaneous ignition of combustibles.

Class 3 (OX-3): An oxidizer that can cause a severe increase in the burning rate of combustible material that it comes in contact with or that will undergo vigorous self-sustained decomposition due to contamination or exposure to heat.

Class 2 (OX-2): An oxidizer that will cause a moderate increase in the burning rate or that may cause spontaneous ignition of combustible materials it comes in contact with.

Class 1 (OX-1): An oxidizer whose primary hazard is that it slightly increases the burning rate but does not cause spontaneous ignition when it comes in contact with combustible materials.

PYROPHORIC MATERIALS (PYRO):
A chemical that will spontaneously ignite in air at or below a temperature of 130°F.

UNSTABLE REACTIVE (UR)
A material, other than an explosive, that in its pure state or as commercially produced will vigorously polymerize, decompose, condense, or become self-reactive and undergo

other violent chemical changes, including explosion, when exposed to heat, friction, or shock, in the absence of an inhibitor, in the presence of contaminants, or in contact with incompatible materials.

Classification of unstable reactive chemicals according to hazard:

Class 4 (UR-4): Materials that, in themselves, are readily capable of detonation, explosive decomposition, or explosive reaction at normal temperatures and pressures. This class should include materials that are sensitive to mechanical or localized thermal shock at normal temperatures and pressures.

Class 3 (UR-3): Materials that, in themselves, are capable of detonation, explosive decomposition, or explosive reaction but which require a strong initiating source or which must be heated under confinement before initiation. This degree should include materials that are sensitive to thermal or mechanical shock at elevated temperatures and pressures.

Class 2 (UR-2): Materials that, in themselves, are normally unstable and readily undergo violent chemical change but do not detonate. This degree should include materials which can undergo chemical change with rapid release of energy at normal temperatures and pressures and which can undergo violent chemical change at elevated temperatures and pressures.

Class 1 (UR-1): Materials that, in themselves, are normally stable but which can become unstable at elevated temperatures and pressures.

WATER REACTIVE CLASS (WR)

A material that explodes, violently reacts, produces flammable, toxic or other hazardous gases, or generates enough heat to cause self-ignition of nearby combustibles upon exposure to water or moisture.

Classification of water-reactive chemicals according to hazard:

Class 3 (WR-3): Materials that react explosively with water without requiring heat or confinement.

Class 2 (WR-2): Materials that may form potentially explosive mixtures with water.

Class 1 (WR-1): Materials that may react with water with some release of energy but not violently.

CRYOGENIC FLUIDS (CRY)

Fluids with a normal boiling point below -150°F.

HIGHLY TOXIC MATERIALS (HTOX)

A material which produces a lethal dose or lethal concentration that falls within any of the following categories:

1. A chemical that has a median lethal dose (LD_{50}) of 50 mg/kg or less of body weight when administered orally to albino rats weighing between 200 and 300

grams.

2. A chemical that has a median lethal dose (LD_{50}) of 200 mg/kg or less of body weight when administered by continuous contact for 24 hours, or less if death occurs within 24 hours, with the bare skin of albino rabbits weighing between 200 and 300 grams.

3. A chemical that has a median lethal concentration (LC_{50}) in air of 200 ppm by volume or less of gas or vapor, or 2 mg/L of mist, fume, or dust, when administered by continuous inhalation for one hour to albino rats weighing between 200 and 300 grams.

Mixtures of these materials with ordinary materials, such as water, may not warrant classification as highly toxic. While this system is basically simple in application, experienced, technically competent persons shall perform any hazard evaluation that is required for the precise categorization of this type of material.

TOXIC MATERIAL (TOX)
A material which produces a lethal dose or a lethal concentration within any of the following categories:

1. A chemical or substance that has a median lethal dose (LD_{50}) of more than 50 mg/kg but not more than 500 mg/kg of body weight when administered orally to albino rats weighing between 200 and 300 grams.

2. A chemical or substance that has a median lethal dose (LD_{50}) of more than 200 mg/kg but not more than 1,000 mg/kg of body weight when administered by continuous contact for 24 hours, or less if death occurs within 24 hours, with bare skin of albino rabbits weighing between 200 and 300 grams.

3. A chemical or substance that has a median lethal concentration (LC_{50}) in air more than 200 ppm but not more than 2,000 ppm by volume of gas or vapor, or more than 2 mg/L but not more than 20 mg/L of mist, fume, or dust, when administered by continuous inhalation for one hour, or less if death occurs within one hour, to albino rats weighing between 200 and 300 grams.

CORROSIVE (COR)
A chemical that causes visible destruction of or irreversible alterations to living tissue by chemical action at the site of contact. A chemical is considered to be corrosive if, when tested on the intact skin of albino rabbits [by the method described in Appendix A of the Code of Federal Regulations (CFR) 49 Part 173.137], it destroys or changes irreversibly the structure of the tissue at the site of contact following an exposure period of four hours. This term does not refer to action on inanimate surfaces. Corrosive liquids usually have a very high pH or a very low pH. For example a pH of 12, 13, or 14, or a pH of less than 1. Corrosives can be solid, liquid, or gas.

AEROSOLS (AERO-1, AERO-2, AERO-3)
A product that is dispensed from an aerosol container by a propellant. Aerosols are classified based upon the heat of combustion (H_C) of their constituents. To calculate the

heat of combustion of an aerosol, multiply the weight percentage of each constituent by its heat of combustion and add together as shown in the following equation:

$$H_C(\text{total}) = Wt.\%_1 \text{ X } H_C(1) + Wt.\%_2 \text{ X } H_C(2) + \ldots + Wt.\%_i \text{ X } H_C(i)$$

Many common heats of combustion can be found in NFPA 30B or in many chemical engineering references such as *Perry's Chemical Engineers' Handbook*. For materials where the heat of combustion is not readily available and for materials where the unknown material is a minor component, use 43.7 kJ/g, which is a typical heat of combustion for hydrocarbons. For example, in an aerosol with 59% water, 40% butane, and 1% fragrance the equation would be:

$$H_C(\text{total}) = .59 \text{ X } 0\text{kJ/g} + .40 \text{ X } 43.3\text{kJ/g} + .01 \text{ X } 43.7 \text{ kJ/g} = 17.76 \text{ kJ/g}$$

Where 0 is the heat of combustion for water, 43.3 is the heat of combustion for butane, and 43.7 is used as the heat of combustion for the fragrance since it is a minor component.

Once the heat of combustion for the aerosol has been calculated, use the following chart to classify the chemical. In the example above, the heat of combustion is 17.76 kJ/g, which means the aerosol is level one (AERO-1). (Aerosols were previously classified as class I-A flammable liquids, but this is no longer accurate.)

Chemical Heat of Combustion	**Aerosol Classification**
0-8,600 Btu/lb (20 kJ/g)	1
8,601-13,000 Btu/lb (30 kJ/g)	2
>13,000 Btu/lb (30 kJ/g)	3

CHEMICAL CLASSIFICATION FORM

COMMON NAME	CHEMICAL NAME	% Comp	CAS #	FORM	QUANT. STORED	QUANT. IN USE (Open/ Closed)	LOCATION (Storage & Use)	HAZ. CLASSES	JUSTIFICATION

SR# (if applicable):_____

Company Name: _____ Page_____of_____

Company Address: _____ Area: _____