HAZARDOUS MATERIAL PLAN REVIEW SUBMITTAL REQUIREMENTS

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COLORADO SPRINGS FIRE DEPARTMENT
Division of the Fire Marshal

If you have any questions or comments regarding the information contained within, please contact:

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I. Abstract

Hazardous material plan reviews require accurate and concise information to verify code requirements thus ensuring a safe building and/or process. Preparing documents for a hazardous materials plan review submission can be a daunting, confusing and frustrating process. In many instances, the Colorado Springs Fire Department receives hazardous material plans that are lacking the required information or the information is presented in a way not clear to the plan reviewers. As a result, plans are disapproved until accurate and concise information is provided. Disapproved plans not only frustrate contractors and design professionals, but owners as well.

This document provides information and instruction on how to accurately and concisely prepare a Hazardous Materials Inventory Statement (HMIS) utilizing standard fire department forms. Without an HMIS, the hazardous material plan review cannot be completed.

It is preferred that chemical inventory reporting is done through the CSFD HAMMERS website.

However, for the purposes of a hazardous material plan review, forms are available online which allow the user to report chemical inventories utilizing hard copies.

Note that prior to final Certificate of Occupancy, all chemicals **must** be entered in the HAMMERS website.

To prepare an HMIS based on the Colorado Springs Fire Code, you are required to report the maximum quantities of chemicals found in your facility, separated by Hazard Category, and by location. You are also requested classify the chemicals as to storage and manner of use. Handling and storage requirements are determined by the following factors: the nature of chemical or its hazard; the location; the manner of use or storage; and the quantity involved in each particular manner of use or storage. *It is strongly recommended that this information be prepared by a licensed design professional familiar with hazardous materials.* Not doing so may result in delays in the plan review process.

Permitting and reporting quantities vary with the chemical's characterization. Some chemicals have multiple hazards. In these cases, the most restrictive quantities apply in permitting requirements but all hazards should be considered in handling and storage requirements.

The information contained within this document should not be used as the sole means of classifying hazardous materials. (Permit) quantities listed means that a permit from the Fire Department is required if this class of material is handled at or above the specified quantity.

FOR YOUR INITIAL CHEMICAL INVENTORY, REPORT ALL CHEMICALS REGARDLESS OF QUANTITY TO PROPERLY DETERMINE ALL REQUIREMENTS!

II. Definitions

Control Area - a space within a building, where quantities of hazardous material not exceeding the *maximum allowable quantities per control area* are stored, dispensed, used or handled.

Maximum Allowable Quantities Per Control Area – The maximum amount of hazardous materials allowed to be storing or using within a Control Area inside a building or an Outdoor Control Area. The maximum allowable quantity per control area is based on the material state (solid, liquid or gas) and the material storage or use conditions.

Outdoor Control Area – An outdoor area that contains hazardous materials in amounts not exceeding the maximum allowable.

III. Plan Submission Requirements

The following items are required for all hazardous materials plan review submissions. By providing all items

shown below in an accurate and concise method, a smoother and faster plan review process will result.

A. Construction Plan Requirements

The following items must be shown and identified on construction shop drawings:

- Floor and/or site plans for each area inside or outside the building containing hazardous materials
- Lot/property lines and adjacent buildings for outside storage
- All storage and use areas including hazardous waste storage areas
- Access to each storage and use area
- Location of all aboveground and underground tanks to include sumps, vaults, below-grade treatment systems, piping, etc.
- Chemical hazard classes in each area
- Locations of all H occupancies, control areas and exterior storage and use areas
- All locations of processes/operations present as indicated on the Hazmat Triage Form
- Spill control and secondary containment, if applicable
- Hourly rating of all H-occupancy walls
- Compliance with specific requirements throughout the individual fire code chapters that pertain to each particular hazardous material
- Compliance with H-occupancy requirements of the Building Code

B. Supplemental Information Requirements

The following information must be included with construction shop drawings utilized for hazardous materials reviews:

- Completed and accurate hazardous materials permit application
- Hazmat Triage Form
- Hazardous Materials Inventory Statement (HMIS)
- Detailed equipment list of all equipment used with hazardous materials
- Manufactures specifications (i.e. cut sheets) for all equipment in equipment list clearly showing listing approvals (i.e. UL)
- Secondary containment volume calculations
- Additional information deemed necessary for a complete plan review

IV. Instructions for Completing the Hazardous Materials Inventory Statement (HMIS)

The following instructions pertain to the three specific forms that make up the HMIS. These forms must all be completed and submitted as part of a hazardous materials plan review. Doing so will result in a smoother plan review process. The forms are available in Microsoft Word and Excel formats. Completion of these forms will also assist the user when entering the chemical information into the HAMMERS program. *Do not substitute MSDS sheets for the HMIS. MSDS may be submitted in addition to, but not in place of the HMIS.*

What chemicals should be reported on the HMIS?

Generally:

- Chemicals that require a permit per the Colorado Springs Fire Code
- Containers that are marked with US Department of Transportation (DOT) hazard labels, such as “Flammable Liquid,” “Corrosive,” “Explosive,” and “Organic Peroxide”
- All compressed gas cylinders marked with a DOT Hazard Label
- Products with the US Environmental Protection Agency warning label of “Danger” or “Warning”
- Fuel used in Generators and Fire pumps
- Chemicals that are a physical or health hazard
- All products that have a NFPA 704 hazard rating of a “4”, “3”, or “2” in any one of the rating boxes or have a special hazard rating, i.e. Water Reactive (W), Corrosive (COR) or Oxidizer (OXY)

What can be excluded from the HMIS?

Generally:

- Office supplies like copier toner or correction fluid
- Cleaning products intended for consumer use

A. Chemical Inventory Worksheet

For each Control Area, use one form for each Hazard Category of chemicals found in this location. Make copies of the form or complete the spreadsheet as needed, so that you will have enough for the number of Hazard Categories and the number of Control Areas you have. Refer to the Hazardous Materials Hazard Categories list for the Hazard Category. The Hazard Category should be specified down to the Class level. For example, Flammable Liquids should be reported as Class I-A, Class I-B or Class I-C in separate worksheets. Choose the Hazard Category and write the Control Area location in the spaces provided on the worksheet form.

For each chemical in a specified Hazard Category in a specific Control Area, enter the information required under each column. These are the following:

1. Project Address: the address in which the hazardous materials will be located. This should be the same address as shown on all permits for the project.
2. Control Area: the area within a building or outside a building, meeting the definition above. The same text provided here must also be shown on the construction plans (i.e. Room 215; Warehouse 1, Control Area 3, etc.)
3. Hazard Category: select from the drop-down list, or write in, the Hazard Category/Class Level for all of the chemicals listed on the worksheet for the given control area. Only one Hazard Category, per Control Area may be used per worksheet. In other words, if a given Control Area has chemicals within 5 different Hazard Categories, 5 different worksheets for that single Control Area must be completed. For help in determining Hazard Categories, see Section V of this document. In the event that a chemical falls under multiple Categories, choose the most restrictive/hazardous regarding permitting.
4. Chemical Name: use chemical name if known or the common name. Common name is usually the trade name or the name by which the chemical is known in industry.
5. C.A.S #: numbers universally used to provide a unique, unmistakable identifier for chemical substances. A CAS Registry Number itself has no inherent chemical significance but provides an unambiguous way to identify a chemical substance or molecular structure when there are many possible systematic, generic, proprietary or trivial names.
6. State: select from the drop-down list if the chemical is solid, liquid or gas at standard temperature and pressure. If found on site in various states, separate by listing each state in a separate row.
7. Container Size: give the capacity of each type of container used to hold the chemical, whether in storage or when in use. Use “Lb.” (Pound) for solids, “Ga.” (Gallon) for liquids and “CF” (Cubic Feet) for gases. Use a separate line for each different container size for each given chemical.
8. Maximum Quantities (MAQ’s): the maximum amount of chemicals that may be present at any given time within the specified Control Area.
9. Inside Building/Outside Building: enter the maximum quantities of the chemical that may be found inside any or all of the buildings on site, outside any or all of the buildings on site.

   Used Open/Used Closed/Stored: further specify the maximum quantities into “Use” or “Storage.” A chemical is in “use” if the container is opened or connected to any equipment while on site. A chemical may be used in an “Open System” or a “Closed System.” The Open/Closed system of use refers to the ability of gas, liquid, vapor or dust to escape from the container into the atmosphere during normal operations. “Stored” means that the material is held (in storage) without being used up or without going through any process or process equipment. When in storage, a container is not opened or connected to any equipment and the chemical is not dispensed in any way.

10. Total in Control Area: add up the quantities used and stored, inside and outside buildings.
11. Hazardous Waste Generated: select from the drop-down list whether any hazardous waste is generated from the use of the chemical.
12. Totals: add the quantities listed under each column, separating solids, liquids, and gases. Note that units should be consistent: pounds for solids; gallons for liquids; and cubic feet for gases.

B. Chemical Inventory by Control Area

Summarize the quantities per Hazard Category, by storage and manner of use for solids, liquids, and gases in each Control Area. The number of rows presented in the summary for the Control Area should equal the number of Chemical Inventory Worksheets (one worksheet for each Hazard Category) for that

Control Area. Make copies of the summary form as needed.

1. Project Name: the name of the project that is on the construction documents showing chemical locations.
2. Project Address: the address in which the hazardous materials will be located. This should be the same address as shown on all permits for the project.
3. Control Area: the area within a building or outside a building, meeting the definition above. The same text provided here must also be shown on the construction plans (i.e. Room 215; Warehouse 1, Control Area 3, etc.)
4. Hazard Category: select from the drop-down list, or write in, the Hazard Category/Class Level for all of the chemicals within the given control area. Only one Hazard Category, per Control Area may be used per worksheet. For help in determining Hazard Categories, see Section V of this document. In the event that a chemical falls under multiple Categories, choose the most restrictive/hazardous regarding permitting.
5. Used Open/Used Closed/Stored: specify the maximum quantities of each Hazard Category/Class Level into "Use" or "Storage." A chemical is in "use" if the container is opened or connected to any equipment while on site. A chemical may be used in an "Open System" or a "Closed System." The Open/Closed system of use refers to the ability of gas, liquid, vapor or dust to escape from the container into the atmosphere during normal operations. "Stored" means that the material is held (in storage) without being used up or without going through any process or process equipment. When in storage, a container is not opened or connected to any equipment and the chemical is not dispensed in any way. The amounts entered here must correspond to those amounts indicated in the Chemical Inventory Worksheet.

C. Chemical Inventory Summary for the Entire Facility

Report the total quantities per Hazard Category/Class Level, by storage and manner of use for solids, liquids and gases in all Control Areas. This Chemical Inventory Summary for the Entire Facility lists all the Hazard Categories as contained in the Hazardous Materials Hazard Categories list found in Section V

1. Project Name: the name of the project that is on the construction documents showing chemical locations.
2. Project Address: the address in which the hazardous materials will be located. This should be the same address as shown on all permits for the project.
3. Used Open/Used Closed/Stored: specify the maximum quantities of each Hazard Category/Class Level into "Use" or "Storage." A chemical is in "use" if the container is opened or connected to any equipment while on site. A chemical may be used in an "Open System" or a "Closed System." The Open/Closed system of use refers to the ability of gas, liquid, vapor or dust to escape from the container into the atmosphere during normal operations. "Stored" means that the material is held (in storage) without being used up or without going through any process or process equipment. When in storage, a container is not opened or connected to any equipment and the chemical is not dispensed in any way. The amounts entered here must correspond to those amounts indicated in the Chemical Inventory Worksheet as well as Chemical Inventory by Control Area.

V. Hazard Categories

A. Physical Hazards

A chemical for which there is evidence that it is a combustible liquid, cryogenic fluid, explosive, flammable (solid, liquid or gas), organic peroxide (solid or liquid), oxidizer (solid or liquid), oxidizing gas, pyrophoric (solid, liquid or gas), unstable (reactive) material (solid, liquid or gas) or water-reactive material (solid or liquid).

1. Explosives, Blasting Agents, and Detonators

(Permit = Any Amount)

Explosive is a material that causes sudden, almost instantaneous release of pressure, gas, and heat when subjected to sudden shock, pressure, or high temperatures. Blasting agent is a material or mixture consisting of a fuel and an oxidizer, not otherwise classified as explosive. Detonator is a component in an explosive train that is capable of initiating detonation in a

subsequent high explosive component.

High explosives. Can be detonated by means of blasting caps when unconfined. Examples: dynamite, TNT, nitroglycerine, C-3, C-4.

Low explosives. Can be deflagrated when confined. Examples: black powder, smokeless powder, propellant explosives, display fireworks.

Blasting agents. Oxidizer and liquid fuel slurry mixtures. Examples: ammonium nitrate combined with fuel oil.

2. Compressed Gases

Compressed gas is a material or mixture which is a gas at 68°F or less at one atmosphere of pressure (14.7 psia) AND has a boiling point of 68°F or less at 14.7 psia, which is either liquefied, nonliquefied, or in solution. Exception: Gases which have no other health or physical hazard properties are not considered "compressed" until the pressure in the packaging exceeds 41 psia at 68°F.

Flammable Gas. Examples: acetylene, carbon monoxide, ethane, ethylene, hydrogen, methane. (Ammonia will ignite and burn, although its flammable range is too narrow for it to fit the definition of a flammable gas.)
(Permit = 200 cu ft at STP)

Note: STP refers to standard temperature and pressure, defined as 0°C (32°F) and 1 atmosphere (14.7 psi) pressure

Oxidizing. Examples: oxygen, ozone, oxides of nitrogen, chlorine, fluorine. Chlorine and fluorine do not contain oxygen, but react with flammable materials in a manner similar to oxygen.
(Permit = 504 cu ft at STP)

Corrosive. Examples: ammonia, hydrogen chloride, fluorine.
(Permit = 200 cu ft at STP)

Highly toxic. Examples: arsine, cyanogen, fluorine, germane, hydrogen cyanide, hydrogen selenide, nitric oxide, phosphine, stibene.
(Permit = Any Amount)

Toxic. Examples: chlorine, hydrogen fluoride, hydrogen sulfide, silicon tetrafluoride, phosgene.
(Permit = Any Amount)

Inert (chemically unreactive) and Simple Asphyxiants. Examples: argon, carbon dioxide, helium, krypton, neon, nitrogen, xenon.
(Permit = 6,000 cu ft at STP)

Pyrophoric. Examples: diborane, dichloroborane, phosphine, silane.
(Permit = Any Amount)

Unstable (reactive). Examples: butadiene (unstabilized), ethylene oxide, vinyl chloride.
(Permit = Any Amount)

3. Flammable and Combustible Liquids

Flammable liquids

(Permit = 25 gal. inside bldg., 60 gal. outside bldg.)

CLASS I-A liquids have flash points below 73°F and boiling points below 100°F.
CLASS I-B liquids have flash points below 73°F and boiling points at or above 100°F.
CLASS I-C liquids have flash points at or above 73°F but below 100°F.

Combustible Liquids

CLASS II liquids have flash points at or above 100°F but below 140°F.
Example: diesel fuel, kerosene
(Permit = 25 gal. inside bldg., 60 gal. outside bldg.)

CLASS III-A liquids have flash points at or above 140°F but below 200°F.
Example: phenol, creosote oils
(Permit = 25 gal. inside bldg., 60 gal. outside bldg.)

CLASS III-B liquids have flash points at or above 200°F.
Example: motor oil, ethylene glycol
(Permit = 25 gal. inside bldg., 60 gal. outside bldg.)

4. Flammable Solids

(Permit = 100 lbs.)

Flammable solid is a solid substance that is not defined as explosive or blasting agent, is liable to cause fire through friction or as a result of retained heat from manufacture, has an ignition temperature lower than 212°F, or burns so vigorously and persistently when ignited that it creates serious hazards.

Organic solids. Examples: camphor, cellulose nitrate, naphthalene.

Inorganic solids. Examples: decaborane, lithium amide, phosphorous heptasulfide, phosphorous sesquisulfide, potassium sulfide, anhydrous sodium sulfide, sulfur.

Combustible metals (except dusts and powders). Examples: cesium, magnesium, zirconium.

Magnesium

A Flammable Solid used to make strong lightweight alloys. This applies to the pure metal and alloys, of which the major part is magnesium.
(Permit = 10lbs.)

Combustible dusts and powders (including metals). Finely divided flammable solids which may be dispersed in air as a dust cloud. Examples: wood sawdust, plastics, coal, flour, powdered metals (few exceptions).

5. Combustible Fibers

(Permit = 100 cu ft)

Readily ignitable and free burning materials in a fibrous or shredded form, such as cocoa fiber, cloth, cotton, excelsior, hay, hemp, henequen, istle, jute, kapok, oakum, rags, sisal, Spanish moss, straw, tow, wastepaper, certain synthetic fibers or other like materials. Does not include densely packed baled cotton.

6. Oxidizers

Oxidizer is a material - other than a blasting agent or explosive - that initiates or promotes combustion in other materials, thereby causing fire either of itself or through the release of oxygen or other gases.

Gases. Examples: oxygen, ozone, fluorine, chlorine (see Compressed Gases, Oxidizing).
(Permit = 504 cu ft at STP)

Liquids. Examples: bromine, hydrogen peroxide, nitric acid, perchloric acid, sulfuric acid. (See more detailed classification below.)

Solids. Examples: chlorates, chromates, chromic acid, iodine, nitrates, nitrites, perchlorates, peroxides. (The following gives a more detailed classification.)

Classifications of liquid and solid oxidizers according to hazard:

CLASS 4: An oxidizing material that can undergo an explosive reaction when catalyzed or exposed to heat, shock, or friction. Examples: ammonium perchlorate, ammonium permanganate, guanidine nitrate, hydrogen peroxide solutions more than 91% by weight, perchloric acid solutions more than 72.5 % by weight, potassium superoxide, and tetranitromethane.
(Permit = Any Amount for either liquid or solid)

CLASS 3: An oxidizing material that will cause a severe increase in the burning rate of combustible material with which it comes in contact. Examples: ammonium dichromate, bromine pentafluoride, bromine trifluoride, hydrogen peroxide 52% to not more than 91% concentration by weight, calcium hypochlorite over 50% by weight, potassium bromate, potassium chlorate, potassium chlorite over 40% by weight, perchloric acid solutions 60% to 72.5% by weight, potassium dichloro-s-triazinetrione (potassium dichloroisocyanurate), sodium chlorate, sodium chlorite over 40% by weight and sodium dichloro-s-triazinetrione (sodium dichloroisocyanurate).
(Permit = 1 gal liquid; 10 lbs. solid)

CLASS 2: An oxidizing material that will moderately increase the burning rate or which may cause spontaneous ignition of combustible material with which it comes in contact. Examples: barium bromate, barium chlorate, barium hypochlorite, barium perchlorate, barium permanganate. 1-bromo-3-chloro-5, 5- dimethylhydantoin, calcium chlorate, calcium chlorite, calcium hypochlorite (50 percent or less by weight), calcium perchlorate, calcium permanganate, chromium trioxide (chromic acid), copper chlorate, halene (1, 3-dichloro-5, 5-dimethylhydantoin), hydrogen peroxide (greater than 27.5 percent up to 52 percent), lead perchlorate, lithium chlorate, lithium hypochlorite (more than 39 percent available chlorine), lithium perchlorate, magnesium bromate, magnesium chlorate, magnesium perchlorate, mercurous chlorate, nitric acid (more than 40 percent not less than 86 percent), perchloric acid solutions (more than 50 percent but less than 60 percent), potassium perchlorate, potassium permanganate, potassium peroxide, potassium superoxide, silver peroxide, sodium chlorite (40 percent or less by weight), sodium perchlorate, sodium perchlorate monohydrate, sodium permanganate, sodium peroxide, strontium chlorate, strontium perchlorate, thallium chlorate, trichloro-s-triazinetrione (trichloroisocyanuric acid), urea hydrogen peroxide, zinc bromate, zinc chlorate and zinc permanganate.
(Permit = 10 gal liquid; 100 lbs. solid)

CLASS 1: An oxidizing material whose primary hazard is that it may increase the burning rate of combustible material with which it comes in contact. Examples: all inorganic nitrates (unless otherwise classified), all inorganic nitrites (unless otherwise classified), ammonium persulfate, barium peroxide, hydrogen peroxide solutions (greater than 8 percent up to 27.5 percent), lead dioxide, lithium hypochlorite (39 percent or less available chlorine), lithium peroxide, magnesium peroxide, manganese dioxide, nitric acid (40 percent concentration or less), perchloric acid solutions (less than 50 percent by weight), potassium dichromate, potassium percarbonate, potassium persulfate, sodium carbonate peroxide, sodium dichloro-s-triazinetrione dihydrate, sodium dichromate, sodium perborate (anhydrous), sodium perborate monohydrate, sodium perborate tetrahydrate, sodium percarbonate, sodium persulfate, strontium peroxide and zinc peroxide.
(Permit = 55 gal. liquid; 500 lbs. solid)

Note: Examples are based on NFPA 430 – Code for the Storage of Liquid and Solid Oxidizers.

7. Organic Peroxides

Organic peroxide is a flammable compound which contains the double oxygen or peroxy (-0-0-) group and is subject to explosive decomposition. Organic peroxides may be liquids, pastes, or solids (usually finely divided powders). The following gives a more detailed classification of organic peroxides.

Classifications of organic peroxides according to hazard:

UNCLASSIFIED: An "unclassified" peroxide is capable of detonation. This peroxide presents an extremely high explosion hazard through rapid explosive decomposition.
(Permit = Any Amount)

CLASS I: A Class I peroxide is capable of deflagration, but not detonation. This peroxide presents a high explosion hazard through rapid decomposition. Examples: acetyl cyclohexane sulfonyl 60-65% concentration by weight, fulfonyl peroxide, benzoyl peroxide over 98% concentration, t-butyl hydroperoxide 90%, t-butyl peroxyacetate 75%, t-butyl peroxyisopropylcarbonate 92%, diisopropyl peroxydicarbonate 100%, di-n-propyl peroxydicarbonate 98%,di-n-propyl peroxydi-carbonate 85%.

(Permit = Any Amount)

CLASS II: A Class II peroxide burns very rapidly and presents a severe reactivity hazard. Examples: acetyl peroxide, 25%, t-butyl hydroperoxide 70%, t-butyl peroxybenzoate 98%, t-butyl peroxy-2-ethyl - hex-anoate 97%, t-butyl peroxyisobutyrate 75% t-butyl peroxyisopropyl-carbonate 75%, t-butyl peroxy- pivalate 75%, dybenz-oyl peroxydicarbonate 85%, di-sec-butyl peroxydicar- bonate 98%, di-sec-butyl peroxydicarbonate 75%, 1,1-di-(t-butylperoxy)-3,5,5-trimethyecyclohex- ane 95%, di-(2-ethythexyl) peroxydicarbonate 97%, 2,5-dimethyl-2-5 di (benzoylperoxy) hexane 92%, peroxyacetic acid 43%.
(Permit = Any Amount)

CLASS III: A Class III peroxide burns rapidly and presents a moderate reactivity hazard. Examples: acetyl cyclohexane sulfonyl peroxide 29%, benzoyl peroxide 78%, benzoyl peroxide paste 55%, benzoyl peroxide paste 50%, cumene hydroperoxide 86%, di-(4-butycyclohexyl) peroxydicarbonate 98%, t-butyl peroxy-2-ethytehexanoate 97%, t-butyl peroxyneodecanoate 75%, methyl ethyl ketone peroxide 9% active oxygen diluted in dimethyl phthalate.
(Permit = 1 gal. liquid; 10 lbs. solid)

CLASS IV: A Class IV peroxide burns in the same manner as ordinary combustibles and presents a minimum reactivity hazard. Examples: benzoyl peroxide 70%, benzoyl peroxide paste 50%, benzoyl peroxide slurry 40%, benzoyl peroxide powder 35%, methyl ethyl ketone peroxide 9% active oxygen diluted in water and glycols.
(Permit = 2 gal. liquid; 20 lbs. solid)

CLASS V: A Class V peroxide does not burn or present a decomposition hazard. Examples: benzoyl peroxide 35%, 1,1-di-t-butyl peroxy 3,5,5-trimethycyclohexane 40%, 2,5-di-(t-butyl peroxy) hexane 47%, 2,4-pentanedione peroxide 4% active oxygen.
(Permit = Not Required)

8. Pyrophoric Materials

(Permit = Any Amount)

A pyrophoric material will spontaneously ignite in air at or below 130°F

Gases. Examples: diborane, phosphine, silane.

Liquids. Examples: diethyl aluminum chloride, diethyl beryllium, diethyl phosphine, diethyl zinc, dimethyl arsine, triethyl aluminum etherate, thriethyl bismuthine, thriethyl boron, trimethyl aluminum, trimethyl gallium.

Solids. Examples: cesium, hafnium, lithium, white or yellow phosphorus, plutonium, potassium, rubidium, sodium, thorium.

9. Unstable (Reactive) Materials

This is a material, other than an explosive, which in the 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, or in the absence of an inhibitor or in the presence of contaminants or in contact with noncompatible materials.

CLASS 4: A material which in itself is readily capable of detonation or of explosive decomposition or explosive reaction at normal temperatures and pressures. This class includes materials which are sensitive to mechanical or localized thermal shock at normal temperatures and pressures. Examples: acetyl peroxide, dibutyl peroxide, dinitrobenzene, ethyl nitrate, peroxyacetic acid, picric acid (dry) trinitrobenzene.
(Permit = Any Amount)

CLASS 3: A material which in itself is capable of detonation or of explosive decomposition or explosive reaction but which requires a strong initiating source or which must be heated under confinement before initiation. This class includes materials which are sensitive to thermal or echanical shock at elevated temperatures and pressures. Examples: hydrogen peroxide (greater than 52%), hydroxylamine, nitromethane, paranitroaniline, perchloric acid, tetrafluoroethylene monomer.

(Permit = Any Amount)

CLASS 2: A material which in itself is normally unstable and readily undergoes violent chemical change but does not detonate. This class includes 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. Examples: acrolein, acrylic acid, hydrazine, methacrylic acid, sodium perchlorate, styrene, vinyl acetate.
(Permit = 5 gal. liquid; 50 lbs. solid)

CLASS 1: A material which in itself is normally stable but which can become unstable at elevated temperatures and pressures. Examples: acetic acid, hydrogen peroxide 35% to 52%, paraldehyde, and tetrahydrofuran.
Permit = 10 gal. liquid; 100 lbs. solid)

10. Water-Reactive Materials

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

CLASS 3: A material which reacts explosively with water without requiring heat or confinement. Examples: aluminum alkyls such as triethylaluminum, isobutylaluminum and trimethylaluminum; bromine pentafluoride, bromine trifluoride, chlorodiethylaluminium, diethylzinc.
(Permit = Any Amount)

CLASS 2: A material which may form potentially explosive mixtures with water. Examples: calcium carbide, calcium metal, cyanogen bromide, lithium hydride, methyldichlorosilane, potassium metal, potassium peroxide, sodium metal, sodium peroxide, sulfuric acid, trichlorosilane.
(Permit = 5 gal. liquid; 50 lbs. solid)

CLASS 1: A material which may react with water with some release of energy but not violently. Examples: acetic anhydride, sodium hydroxide, sulfur monochloride, titanium tetrachloride.
(Permit = 55 gal. liquid; 500 lbs. solid)

11. Cryogenic Fluids

A material that has a normal boiling point below -150^{o}F (-101.1^{o}C)

Flammable. Examples: carbon monoxide, deuterium, ethylene, hydrogen, methane.
(Permit = 1 gal. inside bldg.; 60 gal. outside bldg.)

Oxidizing. Examples: fluorine, nitric oxide, oxygen.
(Permit = 10 gal. inside bldg.; 50 gal. outside bldg.)

Corrosive. Examples: fluorine, nitric oxide.
(Permit = 1 gal. liquid)

Inert (chemically unreactive). Examples: argon, helium, krypton, neon, nitrogen, xenon.
(Permit = 60 gal. inside bldg.; 500 gal. outside bldg.)

Highly toxic. Examples: fluorine, nitric oxide.
(Permit = Any Amount)

Note: All of the cryogenics listed will exist as compressed gases when they are stored at ambient temperatures.

B. Health Hazards

A classification of a chemical for which there is statistically significant evidence that acute or chronic health effects are capable of occurring in exposed persons. The term “health hazard” includes chemicals that are toxic, highly toxic and corrosive.

1. Highly Toxic and Toxic Materials

Highly toxic materials

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

1. A chemical that has a median lethal dose (LD_{50}) of 50 milligrams or less per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each.
2. A chemical that has a median lethal dose (LD_{50}) of 200 milligrams or less per kilogram 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 2 and 3 kilograms each.
3. A chemical that has a median lethal concentration (LC_{50}) in air of 200 parts per million or less by volume of gas or vapor, or 2 milligrams per liter or less 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 each.

Mixtures of these materials with ordinary materials such as water might not warrant classification as highly toxic. While this system is basically simple in application, any hazard evaluation, which is required for the precise categorization of this type of material, shall be performed by experienced, technically competent persons.
(Permit = Any Amount)

Gases - arsine, chlorine trifluoride, cyanogen, diborane, fluorine, germane, hydrogen cyanide, nitric oxide, nitrogen dioxide, ozone, phosphine, hydrogen selenide, stibene.

Liquids - acrolein, acrylic acid, 2-chloroethanol (ethylene chlorohydrin), hydrazine, hydrocyanic acid, 2-methylaziridine (propylenimine), 2-methyllactonitrile (acetone cyanohydrin), methyl ester isocyanic acid (methyl isocyanate), nicotine, tetranitromethane, tetraethylstannane (tetraethyltin).

Solids - (acetato) phenylmercury (phenyl mercuric acetate), 4-aminopyridine, arsenic pentoxide, arsenic trioxide, calcium cyanide, 2-choloracetophenone, aflatoxin B, decaborane (14), mercury
(II) bromide (mercuric bromide), mercury (II) chloride (corrosive mercury chloride), pentachlorophenol, methyl parathion, phosphorus (white), sodium azide.

Toxic materials

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

1. A chemical or substance that has a median lethal dose (LD_{50}) of more than 50 milligrams per kilogram but not more than 500 milligrams per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each.
2. A chemical or substance that has a median lethal dose (LD_{50}) of more than 200 milligrams per kilogram but not more than 1,000 milligrams per kilogram 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 2 and 3 kilograms each.
3. A chemical or substance that has a median lethal concentration (LC_{50}) in air of more than 200 parts per million but not more than 2,000 parts per million by volume of gas vapor, or more than 2 milligrams per liter but not more than 20 milligrams per liter 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 each.

Gases - boron trichloride, boron trifluoride, chlorine, hydrogen fluoride, hydrogen sulfide, phosgene, silicon tetrafluoride.
(Permit = Any Amount)

Liquids - acrylonitrile, allyl alcohol, alpha-chlorotoluene, aniline, 1-chloro-2, 3-epoxypropane, chloroformic acid (allyl ester), 3-chloropropene (allyl chloride), o-cresol, crotonaldehyde, dibromomethane, diisopropylamine, diethyl ester sulfuric acid, dimethyl ester sulfuric acid, 2-furaldehyde (furfural), furfuryl alcohol, phosphorus chloride, phosphoryl chloride (phosphorus oxychloride), thionyl chloride.
(Permit = 10 gal.)

Solids - acrylamide, barium chloride, barium (II) nitrate, benzidine, p-benzoquinone, beryllium chloride, cadmium chloride, cadmium oxide, chloroacetic acid, chlorophenylmercury (phenyl mercuric chloride), chromium (VI) oxide (chromic acid, solid), 2,4-dinitrotoluene, hydroquinone, mercury chloride (calomel), mercury (II) sulfate (mercuric sulfate), osmium tetroxide, oxalic acid, phenol, P-phenylenediamine, phenylhydrazine, 4-phenylmorpholine, phosphorus sulfide, potassium fluoride, potassium hydroxide, selenium (IV) disulfide, sodium fluoride.
(Permit = 100 lbs.)

2. Radioactive Materials

A radioactive material spontaneously emits ionizing radiation.
(Permit = Any Amount)

Common radiation-source materials. More than 100 radioisotopes are in common usage in various medical and industrial tests and measuring protocols. Most emit beta and gamma radiation. Some emit alpha radiation also while others emit beta or gamma radiation exclusively.

Examples of alpha, beta, gamma emitters: americium-241, bismuth-210, polonium-210, radium-226, uranium-238. These are the heavier isotopes as indicated by high atomic weights.

Examples of beta emitters: calcium-45, carbon-14, hydrogen-3, nickel-63, sulfur-35, tungsten-185, zinc-65.

Examples of gamma emitters: beryllium-7, germanium-71, iron-55, palladium-13, praseodymium-143, promethium-147, tin-113.

Fissile materials. Fissile materials may undergo a fission reaction, and are usually found only at reactor sites, or as part of a nuclear weapon. Fissile materials may emit alpha, beta, gamma, and neutron radiation. Examples: plutonium-238, plutonium-239, plutonium-241, uranium-233, uranium-235.

Note: Uranium (and certain other radioactive metals) are chemically toxic as well as combustible in solid and finely divided form. When radioactive materials burn, the products of combustion (other than heat) will be radioactive as well.

3. Corrosives

A corrosive material causes visible destruction of, or irreversible alterations in, living tissue by chemical action at the site of contact.
(Permit = 55 gal. liquid or 1000 lbs. solid; 200 cu ft gas at STP)

Acids. Examples: chromic, formic, hydrochloric (muriatic greater than 15 percent), hydrofluoric, nitric (greater than 6 percent), perchloric, sulfuric (4 percent or more).

Bases (alkalis). Examples: hydroxides - ammonium (greater than 10%), calcium, potassium (greater than 1%), sodium (greater than 1%), and certain carbonates - potassium.

Other corrosives. Examples: gases such as bromine, chlorine, fluorine, iodine, and ammonia.

Note: Corrosives which are oxidizers, e.g., nitric acid, chlorine, fluorine; or are compressed gases, e.g., ammonia, chlorine, fluorine; or are water-reactive, e.g., concentrated sulfuric acid, sodium hydroxide, are physical hazards in addition to being health hazards.

4. Carcinogens, Irritants, Sensitizers and Other Health Hazards

(Permit = 55 gal. liquid; 500 lbs. solid; 650 cu ft gas at STP)

Carcinogens or suspect carcinogens. Substances which produce or are suspected of producing or inciting cancer. Examples: asbestos, benzene, beryllium, carbon tetrachloride,

chloroform, diazomethane, P-dioxane, ethylene dichloride, polychlorinated biphenyls (PCBs), vinyl chloride.

Other health hazards. Substances which cause damage to particular organs or systems. Hepatotoxin (chemicals which produce liver damage): carbon tetrachloride, nitrosamines.

Nephrotoxins (chemicals which produce kidney damage): halogenated hydrocarbons, uranium.

Neurotoxin (chemicals which produce their primary toxic effects on the nervous system): mercury, carbon disulfide.

Blood or hematopoietic system toxins (chemicals which decrease hemoglobin function, deprive the body tissues of oxygen): carbon monoxide, cyanide.

Reproductive toxins (chemicals which affect the reproductive capabilities, including chromosomal damage [mutations] and effects on fetuses [tersiogenesis]): lead, DBCP.

Irritants. Substances other than corrosive materials which cause a reversible inflammatory effect on living tissue by chemical action at the site of contact: Examples: diphenylaminechloroarsine, xylyl bromide, chloracetophene.

Sensitizers. Substances which cause an allergic reaction in normal tissue after repeated exposure.

C. Miscellaneous Specific to Colorado Springs

These materials are/may be classified as other hazardous categories, however they are specifically listed here since they specifically require permits in the current Colorado Springs Fire Code.

Aerosols

A product that is dispended from an aerosol container by a propellant. Aerosol products shall be classified by means of the calculation of their chemical heats of combustion and shall be designated by of the following:

LEVEL 1 - Those with a total chemical heat of combustion that is less than or equal to 8600 Btu/lb.
(Permit = Not required)

LEVEL 2- Those with a total chemical heat of combustion that is greater than 8600 Btu/lb, but less than or equal to 13000 Btu//lb.
(Permit = 500 lbs.)

LEVEL 3 – Those with a total chemical heat of combustion that is greater than 13,000 Btu/lb.
(Permit = 500 lbs.)

Electrolytes

The medium that provides the ion transport mechanism between the positive and negative electrodes of a cell. Examples: potassium hydroxide, sulfuric acid.
(Permit = 50 gal. liquid)

Pyroxylin (Cellulose Nitrate)

A flammable mixture of nitrocelluloses used especially in making plastics and water-repellent coatings (as lacquers)
(Permit = 25 lbs.)

Liquefied Petroleum Gas (LPG)

A material which is composed predominately of the following hydrocarbons or mixtures of them: propane, propylene, butane (normal butane or isobutene) and butylenes.
(Permit = 125 gal. liquid)

Magnesium

A Flammable Solid used to make strong lightweight alloys. This applies to the pure metal and alloys, of which the major part is magnesium.
(Permit = 10lbs.)