City of Pittsburg

Hazard Communication Program

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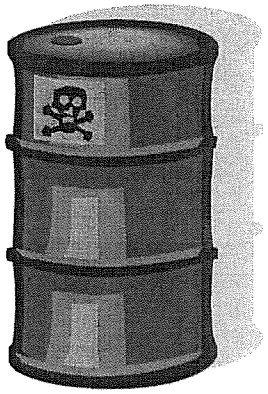

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I. PURPOSE

A. The purpose of the Hazard Communication ("HazCom") Program is to inform employees who handle materials about the potential hazards they may encounter while in their working environment, and to provide them with information that will allow them to properly and safely manage them.

B. City of Pittsburg accomplishes this goal by implementing a comprehensive Hazard Communication Program, which includes:

1. This written plan explaining how we will meet the requirements and intent of the City of Pittsburg Hazard Communication Program;
2. Container labeling and other forms of warning;
3. A list of all chemicals known to be present in the workplace;
4. Material Safety Data Sheets (MSDS's);
5. Employee information and training for regular, new, and non-routine assignments and materials;
6. Methods of communicating hazard information to subcontractors and others sharing our site; and
7. Work place monitoring.

II. POLICY

A. Full implementation of this policy brings City of Pittsburg into full compliance with the Hazard Communication Regulation, 29 CFR 1910.1200, 8 CCR 5194.

B. This written policy, including applicable MSDS's, is available to personnel in the workplace, throughout their shifts.

C. The City of Pittsburg does not discriminate in any manner against employees exercising their rights under this policy.

D. California's Hazard Communication Regulation (Right-to-Know) applies to all employers whose employees may be exposed to hazardous substances.

III. PROCEDURES

In any workplace used by City employees where hazardous substances are stored, transferred, or used:

- All such substances will be properly labeled, stored, secured and accounted for.
- Adequate personal protective equipment will be available for all employees in that area and each employee will be trained in its use.
- All employees will be trained in proper emergency response procedures to follow in the event of a spill.
- The manufacturer's Material Safety Data Sheet (MSDS) for each such material will be readily available to all employees.

IV. HAZARD DETERMINATION

A. Manufacturers and importers are required to assess the physical and health hazards associated with the substances they produce or repackage. This information is conveyed to employers using a system of labels and MSDS's.

B. MSDS's are to be reviewed prior to the material being introduced into the workplace to determine if the substance will present a new or unique hazard within the workplace. When the potential for a new or unique hazard is deemed present, the responsible supervisor(s) will hold a safety meeting to inform employees of the potential new hazard and the necessary precautions.

V. MEASURES TO PREVENT OR LIMIT EXPOSURE TO HAZARDOUS SUBSTANCES

A. *Engineering Controls*: Ventilation system and physical isolation of the chemical from the worker are examples of engineering controls that are the surest means of preventing exposures to hazardous substances. However, they must be properly designed and kept operating at maximum efficiency. For this reason, engineering controls can be the most expensive means and are occasionally not practical.

B. *Personal Protective Equipment:* Respirators and impervious gloves are examples of personal protective equipment that reduce a worker's personal exposure to hazardous substances, but that do not improve the overall workplace environment. Use of personal protective equipment is covered by regulation in many cases to ensure effective protection is afforded.

C. *Administrative Controls*: Certain practices over which workers have personal control, for example, how fast a machine operates or how ingredients are added to a mixing vessel, can significantly affect exposure. Employees should be carefully trained to recognize this fact and work according to prescribed procedures.

D. *Personal Hygiene*: Measures as simple as washing hands before eating or showering at the end of a work shift can significantly reduce the overall

exposure to hazardous substances. Personal hygiene is particularly important when handling high toxic substances. OSHA regulations for certain substance prescribe the personal hygiene practices.

VI. LIST OF HAZARDOUS SUBSTANCES – CHEMICAL INVENTORY

A. 3-ring binders, marked "Material Safety Data Sheets" are kept in each City facility. The binders contain a current list of all hazardous substances to which employees may have possible exposure and relevant MSDS's. Please see Appendix F for the list of locations at each site.

1. Exception: Preparation and distribution of the MSDS does not apply to the following regardless of whether they contain a hazardous substance:

- Hazardous wastes covered by the Federal Environmental Protection Agency (EPA) regulations.
- Tobacco or tobacco products.
- Wood or wood products (except treated wood or other wood containing hazardous substances).
- Substances used in retail food establishments, or other retail trade establishments, exclusive of processing and repair work.
- Consumer products packaged for distribution to the general public.
- Substances used in research laboratories under the supervision of a technically qualified individual.
- Substances already labeled under the Federal Insecticide, Fungicide, and Rodenticide Act. However, for such substances the manufacturer must still prepare an MSDS and make it available upon request.

VII. LABELS AND OTHER FORMS OF WARNING

A. All containers of hazardous substances received must have precautionary labels in English showing:

1. Identity of the contents and hazardous substances;
2. Appropriate hazard warning statements;
3. Name and address of the manufacturer, importer, or responsible party.

B. Information on precautionary labels is in four parts:

1. A signal word such as "Danger," "Warning," or "Caution."
2. A statement of the hazard such as "Flammable."
3. Precautionary measures such as "Keep Away From Heat."
4. First aid procedures such as "In Case of Contact, Flush Eyes with Plenty of Water for at Least 15 Minutes."

C. The supervisors must ensure there are no improperly labeled products in the work area. If a label is missing or illegible, supervisors shall make sure a new one is made and affixed to the container. If an employee discovers a missing or illegible label, (s)he must notify the supervisor. A suitable label may be made and used in the workplace as long as it meets the above criteria.

D. Piping systems and portable containers for transfer of hazardous materials and/or intended for immediate use are **excluded** from California's Hazard Communication Regulation. They are, however, covered by other standards. It is good practice to mark the product identity and hazard warning statement on all containers.

E. It is the responsibility of the supervisor in each work area to ensure the adequacy of container labeling. To further ensure that employees are aware of the hazards of materials used in their work areas, it is the policy of the City to label all secondary containers. The supervisor in each work area will ensure that all secondary containers are labeled with either an extra copy of the original manufacturer's label or with generic labels which contain blocks for identity and blocks for the hazard warning.

F. Hazardous chemicals leaving the work place must comply with the Hazardous Materials Transportation Act in addition to Cal-OSHA requirements.

G. Signs, placards, process sheets, or batch tickets may be used with or instead of the labels if they meet the criteria and are readily accessible to employees in their work area throughout the shift.

VIII. MATERIAL SAFETY DATA SHEETS (MSDS)

A. MSDS's are the primary means of communicating the necessary information about the hazards of substances in employee use. They must be in English and readily accessible during each work shift and in the work area.

B. Product manufacturers are responsible for providing MSDS's (required by Cal-OSHA), although most vendors will include them with shipments or fax them immediately upon request. If one cannot be obtained, a letter must be sent requesting it, and if the manufacturer fails to respond within 25 days, Cal-OSHA must be notified.

C. Each department has the responsibility of obtaining all of the MSDS's for materials used in their department (City Hall) and/or at their facility (satellites). Product formulation or new information about the material may cause the manufacturer to update an MSDS. Departments are to assign staff who will be responsible for ensuring the most current MSDS is maintained in the binder(s).

D. If an employee is exposed to a hazardous substance and needs medical attention, a copy of the appropriate MSDS will be sent or faxed to the treating physician with the employee.

E. All Material Safety Data Sheets contain the following, and if there is no relevant data for the particular field, it should be so stated:

1. Trade name (product identity; same as the label);
2. The Chemical Abstracts Service (CAS) numbers of each hazardous ingredient;
3. Date MSDS was prepared and updated;
4. Manufacturer's name, address and regular and emergency telephone numbers;
5. Physical and chemical properties such as boiling point, vapor pressure, evaporation rate, vapor density, melting point, water solubility, appearance and odor under normal conditions;
6. Physical hazards such as fire, explosion, and materials that will cause a dangerous chemical reaction;
7. Precautions necessary for safe handling, use and storage, including protective measures for repair and maintenance of equipment;
8. Known control measures, including engineering, hygiene and other work practices, and personal protective equipment necessary to protect against the hazards, and eliminate or reduce harmful exposure to the chemical or substance.
9. Emergency and spill clean-up and disposal equipment and procedures;

10. First aid procedures;

11. Specific acute (short term) and chronic (long-term) health hazards, including the signs and symptoms of illness and medical conditions that may be aggravated by exposure.

12. Potential routes of entry of the hazardous substance(s) into the body (e.g., inhaling, skin contact, or swallowing);

13. Employee exposure limits to the chemical, such as Cal-OSHA's PEL and ACGIH's TLV. (The only time the identity of a chemical won't be found is when it's a trade secret. However, the MSDS will still describe hazards and the safety measures they require. In event of emergency, the information must be released to the physician.)

14. Description of signs and symptoms of exposure, such as eye irritation, nausea, dizziness, skin rashes, headache, and existing medical conditions that could be aggravated by exposure.

15. If the chemical is a carcinogen or potential carcinogen.

16. Other regulatory information if applicable.

IX. MONITORING THE WORK AREA

A. The workplace is periodically monitored to ensure control procedures keep exposure levels within the safe limits. The supervisor in charge of the work area ensures that these procedures are followed.

B. If exposure level tests are conducted, the results are made available to employees and their designated representative, including medical records (if any).

C. Work should be stopped for evaluation and remedy if equipment or other controls used for exposure prevention is inoperable, or procedures are not being followed.

D. Suggestions for reducing the potential for exposure are encouraged and may be brought to the attention of the appropriate supervisor or Safety Committee representative.

X. EMPLOYEE INFORMATION AND TRAINING

A. Employees will be provided with the following information:

1. The location and availability of the Hazard Communication Program;

2. Any operations in their work areas in which hazardous materials are present; and,

3. A list of hazardous materials used in the workplace and the availability of related MSDS's.

B. Training is a critical part of the Hazard Communication Program. Employee training will include:

1. Details of the Hazard Communication Program, including labeling system, MSDS information, and how employees obtain appropriate information.

2. Physical and health hazards of chemicals in the work area;

3. Measures employees can take to protect themselves from hazards;

4. Methods and observations that may be used to detect the presence or release of a hazardous chemical in the work areas; and,

4. Emergency and first aid procedures to be followed in case of overexposure.

C. All new employees, employees given a new assignment using a new product, or those involved with a new process, must have training that meets the above criteria. **Prior** to commencing any non-routine work, the supervisor will discuss the following with the employees:

1. Potentially hazardous chemicals encountered;

2. Proper safety measures to follow; and,

3. Measures to lessen the hazards, such as ventilation respirators, presence of another employee, emergency procedures, etc.

D. Training materials may include videotapes, pamphlets, computer-based education, and this Hazard Communication Program. Training will be documented.

E. An oral or written quiz must be given to test understanding and comprehension.

F. Notices can also be posted to emphasize potential hazards and use of exposure prevention measures.

G. Contractors should be provided with the following before beginning any work:

1. Information about hazardous chemicals to which they may be exposed while on the job-site;

2. Precautions the employees are to take to lessen the possibility of exposure; and,

3. Location of this written Hazard Communication Program.

XI. EMERGENCY PROCEDURES

The City of Pittsburg determines appropriate procedures based on the MSDS's and other documents identifying steps to take in emergencies.

A. *First Aid*: Each MSDS includes first aid information specific to the product and must be reviewed to determine response procedures. First aid kits in buildings and vehicles are inspected periodically to ensure the contents include the items specified. *General* first aid responses for overexposure to hazardous chemicals in the workplace include:

1. *Eye Contact*: Flush with large amounts of water for at least 15 minutes. Occasionally lift both upper and lower eyelids and roll eyes. Obtain medical help if irritation persists.

2. *Skin Contact*: Thoroughly wash affected areas with water, remove contaminated clothing, obtain medical help if irritation persists, or large body areas are affected.

3. *Inhalation*: If overcome or affected by vapors, move to fresh air, provide oxygen if possible, obtain medial help.

4. *Ingestion*: Call emergency medical aid immediately. Consult MSDS to determine if vomiting should be induced or if individual should be provide other first aid measures.

B. *Emergency Spill Procedures*: All employees must be familiar with emergency response procedures for hazardous material spills.

1. All releases of hazardous or regulated materials will be immediately reported to the appropriate supervisor.

2. Employees/supervisors should initiate emergency and evacuation procedures and/or follow other specific direction given by Emergency Response personnel.

XII. HAZARDOUS CHEMICALS IN LABORATORIES

Under the "Laboratory Standard", a laboratory is required to produce a Chemical Hygiene Plan that addresses their specific chemical hazards and the City's obligation to maintain employee exposures at or below the permissible exposure limits.

XIII. LAW ENFORCEMENT OFFICERS HANDLING CONTROLLED SUBSTANCES

Law enforcement officers handling controlled substances must be trained on the hazards of controlled substances using the equivalent of Hazard Communication standards. Any handling of a controlled substance seized by a peace officer is covered under this program. Controlled substances are considered to be drugs, substances, or intermediate precursors, and include such things as opiates, cannabis, psilocybin, amphetamines, and cocaine. These controlled substances are considered hazardous waste once they are no longer being used as evidence. Peace officers receive initial training at the POST Basic Academy and will be retrained in accordance with statutory requirements.

APPENDIX A
DEFINITIONS

Absorption	The movement of a hazardous chemical through the skin and into the bloodstream.
Acute	Short term effect, usually of temporary high-level exposure.
CAS Number	A unique identification number assigned by the Chemical Abstracts Service to specific chemical substances.
Ceiling Value (C)	A maximum level. No exposure should ever exceed this level.
Chemical Name	The scientific designation of a chemical in accordance with the nomenclature system developed by the International Union of Pure and Applied Chemistry or the Chemical Abstracts Service rules, or a name which clearly identifies the chemical for purpose of conducting a hazard evaluation.
Chronic	Long term effect. Low level exposure over long periods gives rise to symptoms that develop over time.
Combustible Liquid	A liquid that becomes flammable when heated above 100 degrees Fahrenheit, or having a flashpoint at or above 1OO°F (37.8°C), but below 200°(93.3°C), except any mixture having components with flash points of 200° F (93.3°C) or higher, the total volume of which make up 99 percent or more of the total volume of the mixture.
Compressed Gas	a. A gas or mixture of gases having, in a container, an absolute pressure exceeding 40 psi at 70°F (21.1°C); or, b. A gas or mixture of gases having, in a container, an absolute pressure exceeding 104 psi at 130° (54.4°) regardless of the pressure at 70° F (21.1°C); or; c. A liquid having a vapor pressure exceeding 40 psi at 100°F (37.8°C) as determined by American National Standard Method (ASTM) D-323-72.
Concentration-PPM	Parts per million is a volume-per-volume relation concentration.
Containers	Include, but are not limited to, any bag, barrel, box, can, cylinder drum, vessel, storage tank, etc., that contains a hazardous substance.
Designated Representative	Any individual or organization to whom an employee gives written authorization to exercise employee's rights under this section.

Exposure or Exposed	When an employee is subjected to a hazardous chemical in the course of employment through any route of entry (inhalation, ingestion, skin contact, absorption, etc.), and includes potential (i.e., accidental or possible exposure)
Flammable (Explosive)Limits (LEL & UEL)	LEL and UEL – A flammable material will burn in air when ignited. OSHA refers to these materials as flammable, combustible or explosive. The range of concentration in which these materials burn is limited by the Lower Explosive Limit (LEL). When the gas or vapor is below this concentration, the atmosphere is too rich for the mixture to burn.
Flammable	NFPA, OSHA, and DOT define a "flammable liquid" as a liquid with A flashpoint below 100° (37.8°C). DOT and OSHA classify solids that will ignite readily or are liable to cause fires under ordinary condition of transportation through friction or retained hear from manufacturing or processing, and which burn so vigorously and persistently as to create a serious transportation hazard, as "flammable solids".
Flash Point	The temperature where a flammable liquid produces enough vapor to burn. The test method for determining the flashpoint will also be indicated.
Health Hazard	A chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees. "Health hazard" includes chemicals that are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hemotopoletic system, and agents which damage the lungs skin, eyes, or mucous membranes.
Lethal Dose (LD50)	The amount, usually expressed in milligrams per kilogram, that causes a "percent death rate" in test animals.
Material Safety Data Sheet (MSDS)	Written or printed material concerning a hazardous chemical. (sometimes available electronically)
mg/m^3	Milligrams-per-meter cubed is a weight-per-volume measurement usually applied to dusts, mists and fumes. A cubic meter is a cube, 39.4 inches on a side.
NFPA	National Fire Protection Association
Polymerize	Chaining together of many simple molecules to form a more complex molecule with different properties.

Reactive or Unstable	A chemical that is in the pure state, or as produced or transported, will vigorously polymerize, decompose, condense, or will become self-reactive under conditions of shocks, pressure or temperature. Water-reactive is a chemical that reacts with water to release a gas that is either flammable or presents a health hazard.
Threshold Limit Value (TLV) and Permissible Exposure Limit (PEL)	The TLV is a safe exposure level set by the American Conference of Governmental Industrial Hygienists (ACGIH). A PEL is similar to the TLV, but set by OSHA regulation. Both signify the day-to-day employee exposure level that does not cause adverse effects.

APPENDIX B
HAZARD DETERMINATIONS – Toxic Exposure

Toxic exposure is evaluated by degree of toxicity, and amount absorbed into the body.

Routes of Entry

Inhalation: Gases, vapors, mists, dusts, and fumes, when breathed can either harm the lungs directly, or can be absorbed into the bloodstream and affect other body organs. Because inhalation is the most common and potentially harmful type of exposure, Personal Exposure Limits (PELs) have been set to limit airborne concentration of toxic substances in workplaces.

Absorption: Substances that come into contact with the skin or eyes can either injure directly (for example, an acid burn), or be absorbed into the bloodstream through the intact skin. The MSDS should indicate if skin absorption or direct injury might occur with the substance in question.

Ingestion: Except for cases where highly toxic materials are ingested due to improper personal hygiene practices, such as eating or smoking without first washing highly toxic substance from the hands, ingestion is a less common route of occupational exposure.

Types of Toxic Affects

Acute affects are observed when the exposure is sufficiently large to have an immediate and usually short-term effect. Examples of acute toxicity are chemical skin burns, asphyxiation, and sudden poisonings.

Chronic affects occur after repeated exposure over a longer period of time, and may be associated with relatively low-level exposures. The injury may be slight skin irritation, or it may involve more severe damage to organs and systems, such as lung disease, cancer, or impaired reproductive function.

Health Hazard Determinants

Carcinogenicity: Determination by NTP, IARC, or OSHA that a substance causes cancer is conclusive.

Human Data: Epidemiological studies and case reports of health affects are considered.

Animal Data: Results of toxicological testing in animals used to predict possible health effects in exposed workers.

Adequacy and Reporting of Data: Scientific studies shall be sufficient for hazard determination and reporting on any MSDS.

APPENDIX C
CHEMICAL AGENT CHARACTERISTICS

Chemical Agents are classified by the following characteristics:

Physical Hazards

Flammable: Flammable materials that burn at or below room temperature.

Explosive: Explosive materials that give off sudden, almost instantaneous volumes of gas when subjected to pressure, shock or heat.

Pyrophoric: Pyrophoric materials burn on contact with air.

Oxidizer: Oxidizers are materials that supply oxygen or otherwise help or cause other materials to burn.

Health Hazards

Carcinogens: Determined to cause, or have the potential of causing cancer. They are evaluated by the International Agency for Research on Cancer (IARC), listed by the National Toxicology Program (NTP), or regulated by OSHA as carcinogens.

Corrosive: Substance that causes visible destruction of living tissue.

Highly Toxic: Substance with:

- Median lethal dose of 50 mg or less per kg of body weight orally.
- Median lethal dose of 200 mg or less per kg of body weight by skin contact.
- Median lethal air concentration of 200 ppm by volume or less by inhalation.

Irritant: Substance causing reversible inflammatory effect on living tissue.

Sensitizers: Substance causing an allergic reaction in normal tissue. They can cause changes in the body's defense system and can cause harmful effects at a later time when the individual is exposed to even trace amounts of the material.

Target Organ Toxins: These materials damage one or more particular organ or body systems after exposure. These exposures can cause cumulative damage over time at low concentrations. Affects:

- Hepatotoxins: Substances that produce liver damage.
- Nephrotoxins: Substances that produce kidney damage.

- Neurotoxins: Substances that produce primary toxic effects on the nervous system.
- Hematopoietic: Agents acting on blood or system; decrease hemoglobin function; deprive body tissues of oxygen.
- Pulmonary: Agents that damage lungs: Substances that irritate or damage the tissue.
- Reproductive toxins: Substances affecting reproductive capabilities including chromosomal damage and effects on fetuses.
- Cutaneous hazards: Substances affecting dermal layer of the body.
- Eye hazard: Substances affecting the eye or visual capacity.

***Toxic*:** Substance with:

- Median lethal dose of 50-500 mg per kg of body weight orally.
- Median lethal dose of 200-1000 mg per kg of body weight by skin; or,
- Median lethal dose of 200-2000 ppm or less by volume by inhalation

APPENDIX D
HOW TO READ A PRODUCT LABEL

The hazards posed by chemical products (including household chemicals) other than Pesticides include hazards beyond toxicity alone. The Federal Hazardous Substances Act establishes that a hazardous substance is one which is toxic, corrosive, irritant, flammable or radioactive. All of these properties of the chemical product determine how the product is labeled.

The labels of products containing hazardous substances must bear at least the following information: Signal Word – The signal word "DANGER" on substances which are extremely flammable, corrosive or highly toxic. On those substances which are highly toxic, the additional word "POISON" must be included. The signal word "WARNING" or "CAUTION" can be found on all other hazardous substances.

Labeling will include a list of the common names of the hazardous ingredients; if a hazardous substance has no common name, the chemical name will be listed. Both names may appear on the label, as in this case: "Sodium Hypochlorite" is the chemical name, "Bleach" is the common name.

The name and address of the manufacturer, distributor, packer or seller should also appear on the label.

A description of the principal hazards involved in using the product must be included on the label. In this case, the product is an "IRRITANT" to the skin, eyes and to the gastrointestinal system, if swallowed. Other words that may be used to describe the principal hazard in using other products may include "Vapor Harmful", "Flammable", "Corrosive", "Absorbed Through the Skin" and such.

The label must have a statement of what to do to avoid the hazard (precautions), instructions for safe handling and storage, and first aid instructions and when necessary or appropriate the statement "KEEP OUT OF REACH OF CHILDREN."

APPENDIX E
HOW TO READ A MATERIAL SAFETY DATA SHEET (MSDS)

Although General Industry Safety Order 5149, the Cal/OSHA regulation which implements the Hazardous Substances Information and training Act specifies what information must be included in a Material Safety Data Sheet (MSDS), it does not specify the format to be used. Therefore, many manufacturers and formulators have developed their own formats – and, as a result, it may take careful reading to get the information you need from an MSDS.

The Hazardous Substances Information and Training Act states that a completed OSHA Form 20 (blank Form 20s are available from OSHA) can be used by manufacturers and formulators to fulfill the requirements regarding development of an MSDS for any of their products which are listed, or which contain substances listed, as hazardous in Section 339 of Title 8 (a copy of the List of Hazardous Substances is available from Cal/OSHA Communications, 525 Golden Gate Avenue, 3rd Floor, San Francisco, CA 94102).

GUIDELINES FOR READING AND UNDERSTANDING AN MSDS

Not all Material Data Sheets will contain all of the information discussed in this article and the information will vary depending upon the degree to which the material is hazardous. But this will give you an idea of the kind of information you should expect to find when you read an MSDS.

Every page of the MSDS should have the name of the substance written on it.

If the MSDS is blank or has only a trade name and a lot of N/As ("not applicables") on it. It is not going to be useful. Most MSDS have at least some of the information filled in. By cross-checking the information in various sections, you can determine what you need to know about the hazards of the material.

I. PRODUCTION IDENTIFICATION

- The manufacturer or distributor listed should be able to provide detailed information on the hazards of the material(s) covered by the MSDS.
- Does the trade name on the MSDS agree with the one on the label on the container.
- The synonyms should be those most commonly used for the product.
- Make sure the chemical name and the formula are listed for single substances, and that the trade or brand name and the chemical family are listed if the substance is a mixture. You will find ingredient information in Section II.

II. HAZARDOUS INGREDIENTS

- The materials listed should be those in the product which individually are listed in the List of Hazardous Substances, Section 339 or Title * of the California Administrative Code. One component of a multicomponent product might be listed because of the toxicity (the health hazards it poses), another because of its flammability and a third both for its toxicity and its reactivity.

- Toxic hazard data should be stated in terms of concentration, mode of exposure or test, and animal used; i.e., 100 ppm LC 50 (lethal concentration) rat, 25mg/ M LD 50 (lethal dose) oral mouse or permissible exposure limit from published sources such as Section 5155 of Title 8 of the California Administrative Code or the TLF list published by the American Conference of Governmental Industrial Hygienists.

- Flammable or reactive data should be included as well as flash point, shock sensitivity, or brief data to indicate the nature of the hazard.

- If the concentration of the material in the mixture is 1% or greater and/or has a Threshold Limit Value (TLV) or Permissible Exposure Limit (PEL) – check it against:

  1. Section III – Physical Hazard Data. All of this section should be filled in if the substance is a solvent, catalyst or vehicle.

  2. Section IV – Fire and Explosion Data. All of this section should be filled in with either numbers or procedures if the substance is either a solvent, catalyst, vehicle, oxidizer or explosive metal.

  3. Section V – Health Hazard Information. If a substance has a TLV, it most likely presents a health hazard(s). Be sure that "effects of overexposure" line lists both long-term (chronic) and short-term (acute) consequences of exposure. This is especially true for substances which have some sort of toxic rating, such as LD 50, either in Section 1 or Section II.

  4. Section VI – Reactivity Data. This section should be filled out if the substance is a catalyst, a polymer, a copolymer, a concentrated acid, base or other reactive substance. Also, a chemical may be incompatible with some other substance(s). That some other substance(s) should be listed on the "incompatibility" line.

  5. Section VII – If the substance has a TLV, procedures to follow in the event of a spill or leak should be specified.

6. Section VIII – Special Protection. If the substance has a TLV, this section should always have some information in it no matter what kind of substance it is, because it will either pose a breathing hazard or a skin or eye hazard. This section must give information on protection against any or all of these kinds of exposures.

7. Section IX – Special Precautions. If the substance is flammable, highly reactive, corrosive, explosive or has some other dangerous properties, this section must have information on special handling and storage.

III. PHYSICAL DATA

This section is one of the most important and useful sections on the MSDS both for assessing how hazardous the substance is and how completely the MSDS is filled out. This is especially true for solvents, and that is why solvents are used as an example throughout this article.

The data in this section should be for the total mixture or product. Do not be put off by the terms. Once you know the definitions of the terms, you can make cross checks.

Terms:

- **Boiling Point** is the temperature in degrees Fahrenheit or Centigrade at which liquid boils (or becomes gas). Ranges are given for mixtures.

- **Vapor Pressure** – A high vapor pressure indicates that a liquid will evaporate easily.

The term "volatile" is used to describe a liquid that evaporates easily. This is important to know because it indicates that air concentrations can build up quickly when the material is worked with in its liquid form. Materials with high vapor pressures can be especially hazardous if you are working with them in an enclosed area or in an area with poor air circulation. Vapor pressures are measured in units or millimeters of mercury (mm Hg) at a certain temperature. Xylene with a vapor pressure of 10 mm HG at 27° - 32° C and toluene with a vapor pressure of 36 mm Hg at 30° C are two solvents, for instance, the use of which can lead to hazardous air concentrations. However, even materials with lower vapor pressures may pose an inhalation hazard because the method of handling (for example, spraying versus brushing) also affects the concentration in air. A vapor pressure always has to list a temperature too.

- **Vapor Density** is the relative density or weight of a vapor or gas compared with an equal volume of air. If the vapor density of a substance is less than one, it will tend to rise in air; if the vapor density is greater than one, it will fall in air. Substances with high vapor densities pose a particular problem because they will collect in the bottom of tanks.

- **Solubility** in water refers to the percentage by weight of the substance which can be dissolved in water. Less than 0.1% is considered negligible; -1% is slight; 1% - 10% is moderate; more than 10% is appreciable; and if it can be dissolved in all proportions, it has complete solubility.

- **Appearance and Order** may help you identify the substance you are working with. Do not rely on odor to indicate whether there is a hazardous concentration of the substance in air. Some substances can reach hazardous levels and not have a noticeable odor.

- **Specific Gravity** refers to the ratio of the weight of an equal volume of liquid to the weight of an equal volume of water at a specified temperature. If a substance has a specific gravity greater than one, it will sink in water; if it has a specific gravity less than one, it will float in water.

- **Percent Volatile by Volume** refers to the percentage of a liquid or solid that evaporates at room temperature. The higher the percentage, the faster the substance will evaporate.

- **Evaporation Rate** is the rate at which the material evaporates compared wither to ether which evaporates very quickly or to butyl acetate which evaporates very slowly. The chemical which is used for comparison (ether or butyl acetate) should be listed. If a substance has an evaporation rate greater than one, it evaporates more easily than the chemical it is compared to; if the rate is less than one, it evaporates more slowly than the chemical it is compared to.

The information in the Physical Data section is useful for the control of toxic vapors. Boiling point, vapor density, percent volatile, vapor pressure and evaporation are all useful for designing proper ventilation systems. This information is also useful for design and use of adequate fire and spill containment equipment and procedures.

Make these checks. The boiling point, vapor pressure, percent volatile and evaporation rate are all characteristics of a substance which gives off vapors into the air. If one of these characteristics has been listed, all of them should be filled out.

If a material has a percent volatile greater than 10%, a boiling point below 100% C, and a vapor pressure over five or sic millimeters of mercury (mm Hg), check the following sections to make sure they are filled out and for information:

1. Check the TLV in Section II. A low TLV (i.e. less than 10) means that the material can be very hazardous. You may be better off using a highly volatile substance, like acetone, with a high TLV, than a less volatile substance like

benzene with a low TLV. In fact, a useful way to compare the hazards of solvents when selecting a solvent to use is to divide the evaporation rate by the TLV and see which one is higher, and therefore more hazardous.

2. In Section IV, check to see that the Flash Point and Flammable Limits are filled out. A substance with a vapor pressure of over 5 mm Hg at a room temperature and an evaporation rate of greater than 1 and a flash point of less than 140 F and low LEL (less than 2%) can be a dangerous fire hazard, especially if the percent volatile is also high.

3. Check Section V "Effects of Overexposure" to see if breathing the vapors of the substance can be harmful.

4. Check Section VII, Special Protection Information, to see whether there are recommendations for respiratory protection and/or ventilation controls. If the substance has a TLV and is volatile, this section must be filled out.

5. Make sure that there are some recommendations for storage and handling in Section IX, Special Precautions, especially If the substance has a vapor density that is heavier than air.

IV. FIRE AND EXPLOSION DATA

If you are working with flammables, solvents, peroxides, explosives, metal dusts and other unstable substances, this section is important. If the product does not pose a fire hazard, that should be stated in this section.

Some terms you need to know are:

- **Flash Point** is the lowest temperature at which a liquid gives off enough vapor to make an ignitable mixture of vapor in air in a test container. Flash point and autoignition should be listed in temperature degrees of Fahrenheit or Centigrade or both. Liquids with flash points below 140° F are specially classified liquids by OSHA and require special precautions. Check Section IX, Special Precautions, to see what they are.

- **Flammable Liquids – LEL (Lower Explosive Limit) and UEL (Upper Explosive Limit)** are the lower and upper limits of vapor and air concentration, given as a percentage, which can cause an explosion. The flash point and flammable limits are the most important when related to the boiling point, vapor pressure, per cent volatile and evaporation rate in Section III. If any one of these items is listed, all of the items should be listed in order to provide enough information about the hazards of the material.

- **Extinguishing Media** means what kind of fire extinguisher to use. If the substance is not flammable and/or is complete inert, the MSDS should say so. Otherwise this line must always be filled out.

- **Special Fire Fighting Procedures and Unusual Fire and Explosion Hazards** would need to be described for any combustible material. Some concentrated corrosives, calcium carbide or reactive metals must hot have water applied in case of fire. Check Section II to see if the material is a catalyst, and check Section VI for reactivity with water and polymerization in water or air.

V. REACTIVITY DATA

The information in this section will assist in determining safe storage and handling of hazardous, unstable substances. Instability or incompatibility of the product to common substances such as water, direct sunlight, metals used in piping or containers, acids, alkalies, etc. should be listed here.

- **Stability** – Cross check with other sections:

  1. Section II: A mixture may be unstable if the ingredients include catalysts and vehicles, peroxides, explosives and other unstable or highly reactive substances.

  2. Section IV: Are there unusual fire and explosive hazards?

  3. Section IX: If there are very specific instructions in this section regarding precautions to take in handling and storage, it may indicate that the material is unstable.

- **Incompatibility** – Common materials or contaminants which the specific material could be expected to come into contact with and which could produce a reaction should be listed here. Conditions to avoid should also be listed. Sections IV and IX may contain information on incompatibility not listed in Section VI.

- **Hazardous Decomposition Products** should list products released if the substance is exposed to aging, heating, burning, oxidation or allowed to react. The product's shelf life should also be listed in this section when applicable. Although some materials are innocuous in their original form, when they are exposed to the conditions such as aging, burning, etc., they may form hazardous products.

  1. Check Section IV for fire and explosion hazards regarding these chemicals.

- **Hazardous Polymerization** is a reaction with extremely high or uncontrolled release of energy. If this section is checked, the conditions under which it could occur should be explained.

1. Check Section II. If the substance contains any catalyst and vehicle it may indicate that hazardous polymerization can occur.

VI. HEALTH HAZARD INFORMATION

- **Health Hazard Data** should be the combined estimate of the hazard of the total product. This might be stated as a time-weighted average concentration, permissible exposure limit (PEL) or TLV. Other data such as LD 50 might be used.

- **Routes of Exposure** should contain information about the potential hazard from absorption of the product, the severity of the effect and the basis for that determination. The basis might be animal studies, analogy with similar products or human exposure.

  Typical comments might be:

  - skin contact, single short contact – no adverse effects likely
  - prolonged or repeated skin contact – mild irritation and possibly some blistering
  - eye contact – some pain and mild transient irritation. No corneal scarring.

Check Section II to see if TLVs are listed for any of the ingredients. If TLVs are listed there, they should also be listed in this section; make sure the numbers are the same. If the substance is a mixture of several compounds and a TLV for the mixture is listed in this section, this is only appropriate if all of the ingredients in the mixture contributing to the TLV have the same harmful health effects, such as petroleum solvent vapors which cause drowsiness and unconsciousness. Check Sections I and IV for this information.

Routes of Exposure should list common effects by route of exposure, usually inhalation or absorption by skin contact. It should include chronic and acute effects; as well as information on carcinogenicity, tertogenicity or mutagenicity. Many MSDS lack information on chronic effects.

If inhalation is a primary route of exposure, check the following sections:
- Section III because this section can help you determine how great the hazard might be. Chemicals with high vapor pressure and high volatility usually pose more of an inhalation problem than chemicals with low vapor pressure and low volatility.
- Section VIII because this section should give information on proper respiratory protective devices (with type specified and/or necessary ventilation requirements.)

If skin contact or absorption is a problem, Section VIII should list proper protective equipment (gloves and eye and skin protection).

- **Effects of Overexposure** should indicate relevant signs, symptoms and diseases that could result from acute and chronic exposure to the hazardous substance.

- **Emergency and First Aid Procedures** should contain treatment information that could be used by paramedics and individuals trained in first aid.

Any substance with a TLV should have emergency first aid procedures listed for acute exposures, especially if the material has a low TLV. Check Section IV to see if the chemical presents any unusual fire or explosive hazards.

- **Note to Physician** should include special information which would be important to a doctor including required or recommended preplacement and periodic medical examinations, diagnostic procedures, and medical management of overexposed employees.

VII. SPILL OR LEAK PROCEDURES

- Detailed procedures and protective clothing and equipment and/or ventilation to be used for cleaning up a spill and safe disposal should be indicated here.

1. Check Section II for TLV. A low TLV such as HCN has with a TLV of 10 ppm indicates greater health hazard than a high TLV such as acetone has with a TLV of 750 ppm.

2. Check Section III for volatility and vapor pressure. A high vapor pressure indicates a greater volatility and a greater hazard.

3. Check Section IV for fire and explosive data (combustible and flammable?)

4. Check Section V for health data (inhalation hazard? skin contact hazard?)

5. Check Section VI for reactivity (incompatibility? hazardous polymerization? unstable?)

6. Check Section VIII for information on personal protective equipment.

For example, if a material has a low TLV, is highly volatile, is flammable, unstable and has severe effects of overexposure listed, then very specific procedures on handling a spill or leak need to be spelled out. This section should state whether the substance is incompatible with common clean up procedures or media (such as water).

- **Waste Disposal Methods:** If labeling and special handling of clean-up residue is necessary, that should be stated along with the appropriate method of disposal - for instance, sanitary landfill, incineration, etc.

1. Check Section II. If hazardous materials are listed, there should be specific procedures for waste disposal.

2. Check Section IV, VI, and IX to make sure that the waste disposal method doesn't create another problem.

VIII. SPECIAL PROTECTION INFORMATION

➢ Respiratory Protection

1. Check Section V to see if inhalation is a probable means of overexposure.

2. Check Section III to see how volatile the substance is, to determine the potential degree of hazard.

➢ If respirators are required or recommended, the type and class should be stated, such as "supplied air" or "organic vapor cartridges," or suitable for dust no more toxic than lead, etc.

➢ If protective clothing is required, the type and material of that clothing should be indicated.

➢ Ventilation

1. Check Sections II, III, and V, volatility and route of exposure to assess the degree of inhalation hazard. If the substance is very volatile and the TLV is low, local exhaust ventilation, (which captures contaminants at this point where they are generated), is probably the most effective control. Mechanical, general or dilution ventilation is not recommended for chemicals with a low TLV, especially if they are highly volatile or have high evaporative rates.

➢ Protective Gloves

1. Check Section II for TLV of substance and Section V to determine if the skin is a primary route of exposure.

2. If gloves are recommended, the type should be specified. Check Section I for chemical family to make sure proper gloves are being recommended.

➢ Eye Protection

1. Check Section V for information regarding hazards to the eye. First aid procedures may be listed, such as flooding with water. If splashes may occur, eye protection and eyewash facilities should be recommended.

IX. SPECIAL PRECAUTIONS

- How to label the substance, or required signs to be posted might be listed here, as well as any information on safety or health which has not been covered in other sections of the MSDS.

1. Check Section III for volatility, Section IV for flash point and flammability, Section IV for exposures and Section VI for reactivity. If all of them are left blank or filled with NA, but this Section IX is filled out in detail, it should make you question the completeness and accuracy of the MSDS. In that case, you may need to check back with the manufacturer of the product.

- References to published guides or procedures for more specific information for identification, handling or storage of the product might be listed here. Other information such as Department of Transportation markings and classification and other freight, handling or storage requirements and environmental control procedures might be listed here.

It is essential that the name and address of the responsible person who prepared the MSDS and the date the information was compiled be included in the MSDS so that you can contact that person for additional information if necessary.

APPENDIX F
CHEMICAL INVENTORY LOCATIONS

- City Hall mail room – 65 Civic Avenue
- Corporation Yard – 357 East 12th Street
- Environmental Center – 2581 Harbor Street
- Senior Center – 300 Presidio Lane
- Housing Authority – 333 Leland Road
- CDBG – 710 Black Diamond Boulevard
- Water Treatment Plant – 300 Olympia Drive
- Golf Maintenance Shop – 2255 John Henry Johnson Parkway
- Golf Pro Shop – 2242 Golf Club Road
- Marina – 51 Marina Boulevard