WSU-TFREC Hazard Communication Training

(WAC 296-800-170)

Developed by the Division of Occupational Safety & Health (DOSH) for employee training
Hazard communication

This training will cover the following:

• What are hazardous chemicals?
• How do hazardous chemicals affect the body?
• What are the different types of hazardous chemicals?
• What is on product labels?
• What are material safety data sheets?
• How do you protect yourself from hazardous chemicals?
What is hazard communication

• Hazard communication or “hazcom” is our program where we tell you about the hazardous chemicals used in our workplace
• We will also train you on how to protect yourself from the effects of these hazardous chemicals
• Hazcom training is required by the Washington State Department of Labor and Industries (L&I)
What is a “hazardous chemical”?

- A hazardous chemical is any chemical that can do harm to your body.
- Most industrial chemicals can harm you at some level.
- It depends how much gets into your body.
How do hazardous chemicals affect the body?

• How the chemical enters the body
• The physical form of the chemical
• The amount of chemical that actually enters the body = the dose
• How toxic (poisonous) the chemical is
How chemicals enter the body

There Are Three Routes of Entry:

• **Ingestion** – swallowing the chemical

• **Inhalation*** – breathing in the chemical

• **Absorption** – the chemical soaks through the skin

* At work, inhalation is the most common route of entry
Inhalation (breathing)

• Chemicals in the air are breathed in through the mouth or nose
• Gases and vapors are absorbed through the lungs directly into the bloodstream
• The size of dust particles or mist droplets affects where the chemical settles in the respiratory tract
• The chemicals that go deeper into the lungs often cause the most damage
Skin absorption

Some chemicals can pass through the skin into the body

These chemicals can then cause various health effects
Ingestion (swallowing)

- Chemicals that are swallowed are absorbed in the digestive tract
- Chemicals can rub off dirty hands and contaminate food, drinks or tobacco products
- Chemicals in the air can settle on food or drink and be swallowed

Wash your hands before eating, drinking or smoking!
The three forms of chemicals

All chemicals exist in one of three forms:

Solid

Liquid

Gas
Hazardous chemicals - dust

• Some chemicals are solids in the form of powders or dust
• Dust can be released into the air by cutting, drilling, grinding or sanding
• Dust can also be stirred up by dry sweeping and inhaled
Hazardous chemicals - dust

- Dust in the air can settle out on work surfaces, cups, plates, utensils, and food
- The settled dust can be swallowed with food or drinks
- If the dust is hazardous, it can cause health problems
Solids – fumes and fibers

• Fumes are extremely small droplets of metal formed when the metal has been vaporized by high temperatures (usually welding)

• Some solids are fibers which can be similar to dusts but they have an elongated shape (like asbestos or fiberglass)
Hazardous chemicals - liquids

• Liquid chemicals in direct contact with the skin can cause skin problems
• Some liquids can be absorbed into the body through the skin
• Liquids can be sprayed and form mists or evaporate and form vapors that can be inhaled
Liquids (mists)

- The most common exposure to mists is from inhalation.
- Mists can settle on the skin and be absorbed into the body.
- Airborne mists can also settle out and contaminate food or drink.
- Paint overspray is a common cause of mist exposure.
Gases and vapors

- Gases are chemicals that are in the gas phase at room temperature
- Vapors evaporate from substances that are liquids or solids at room temperature
- Gases and vapors enter the body by inhalation
- Gasses do not normally pass through the skin
Toxicity: how poisonous are chemicals?

• **Dose** - The effects of any toxic chemical depends on the amount of a chemical that actually enters the body

• **Acute Toxicity** - the measure of how toxic a chemical is in a single dose over a short period of time

• **Chronic Toxicity** – the measure of the toxicity of exposure to a chemical over a long period of time
Chronic and acute toxicity

• Some chemicals will only make you sick if you get an ‘acute” or high dose all at once
  Example: ammonia

• Some chemicals are mainly known for their chronic or long-term effects
  Example: asbestos

• Most chemicals have both acute and chronic effects
  Example: carbon monoxide
Many chemicals have exposure limits, or allowable amounts of a chemical in the air.

These limits are often called “Permissible Exposure Limits” (PELs) or “Threshold Limit Values” (TLVs).

They are based on 8-hour average exposure or ceiling or peak levels.

Levels must be kept below these limits for safety.
Carcinogens

- Carcinogens are cancer-causing compounds
- Some chemicals are known human carcinogens, others are only suspected as carcinogens.
- L&I has regulations covering the general use of carcinogens, and has specific regulations for several known human carcinogens
Other toxic chemicals

Teratogens
Teratogens are compounds that can harm the developing fetus, causing birth defects or death.

Mutagens
Mutagens cause genetic mutations or changes. These mutations can cause birth defects or other problems in following generations or may lead to cancer in the exposed person.
Other toxic chemicals

Sensitizers

• Sensitizers can “switch on” a reaction in an individual worker

• The reaction to a sensitizer depends upon the individual worker

• Once a worker becomes sensitized to a compound, smaller and smaller exposures can cause a reaction, and the reactions can become more severe
Corrosive chemicals

• Acids and bases (caustics) are common corrosive chemicals
• Corrosive chemicals are capable of damaging eyes, skin and the respiratory system
• Corrosives can cause visible skin burns or damage

• The extent of skin damage depends on the concentration of the corrosive and how long the corrosive is on the skin
Corrosive chemicals

• Inhalation of corrosive mists or vapors can cause severe bronchial irritation
• Corrosives are especially damaging to the eyes
  • Protect your eyes by wearing goggles
  • Eyewashes are required where corrosives are handled
  • Quick and thorough rinsing will minimize damage
Examples of corrosive chemicals

- Sulfuric acid
- Ammonia
- Chromic acid
- Lye
- Acetic acid
- Chlorine
- Sodium hydroxide

Batteries contain sulfuric acid
Protection from corrosives

Protective gloves & clothing

Goggles

Eyewashes

Water (for splashes on the skin)
Flammable liquids

The vapor of a flammable liquid ignites and causes fire or explosion – not the liquid itself.

The flammability of a liquid depends on its physical properties:

- Vapor pressure
- Flash point
- Limits of flammability
- Vapor density
Flammable liquids: vapor pressure

• Vapor pressure is a measure of how fast a liquid evaporates
• The higher the vapor pressure the more rapidly the liquid will evaporate
• Vapor pressure goes up and down with the temperature of the liquid
Flammable liquids: flashpoint

The flash point is the **lowest** temperature that a flammable liquid can generate enough vapor to form a mixture with air that will ignite.
Limits of flammability

• The limits of flammability is the range that a mixture of air and vapor is flammable
• Mixtures can be too lean (not enough vapor) or too rich (too much vapor) to ignite and burn

Example: automobile engine

Even though gasoline is very flammable, the car won’t run if the mixture is too rich or too lean
Flammable limits example

Methane

Air 100% | Too Lean | Methane 0% | Boom! |
5.3% LFL | 15.0% UFL |

Air 0% | Too Rich | Methane 100% |

LFL = Lower flammable limit
UFL = Upper flammable limit
Lower flammable limit (LFL)

• In most work situations, the “lower flammable limit” (LFL) is the main concern.

• Vapors from flammable liquids can be found in the workplace, but are often too diluted to catch fire or explode.

• However, these vapors can quickly go above the LFL in a small room or confined space like a tank.
“Vapor density” is a measure of how heavy a vapor is compared to air.

Vapors with a density greater than air (e.g., propane) can flow like a liquid and collect near the floor.

If the vapor flows to an ignition source, this may create a fire or explosion hazard.
Metal hazards

• Metals can be both physical hazards and health hazards.
• Some metals can ignite and explode – magnesium, or dusts/filings of other metals such as aluminum
• Some metals are almost non-toxic – iron, aluminum
• Others are very toxic – mercury, lead, cadmium, beryllium
Metal hazards

• Welding, cutting and grinding create dust or fumes that can be inhaled
• Powdered metals can burn rapidly and intensely
• Airborne dusts and filings can explode when ignited (aluminum)
• Some metals are carcinogenic (chromates found in paints or in metal plating)
• Metals can cause health effects such as elevated blood pressure, brain damage, kidney failure and death
TFREC hazardous chemicals

**WHAT?**

- Most common = pesticides, fertilizers, paint, cleaners, solvents, and adhesives

**WHERE?**

- **Laboratory** - your supervisor will show you where your program’s hazardous chemicals are located

- **Orchards/grounds** – check for pesticide application before you go:
  - Bulletin board (Overley by mailboxes)
  - Web: [http://www.tfrec.wsu.edu/pages/Admin/Pesticide_Applications](http://www.tfrec.wsu.edu/pages/Admin/Pesticide_Applications)
Hazardous chemical information

• You can get information two ways:

  From the product label (GOOD)

  From the product material safety data sheet (BEST)
What is an MSDS?

• Material safety data sheets or “MSDSs” are information sheets on products that include:
  • What chemicals are in the product
  • What the hazards of the chemicals are
  • How to protect yourself from the hazards
MATERIAL SAFETY DATA SHEET

Trade Name: ACETONE

Chemical Family: Acetone

Formula: C₃H₆O

Manufacturer: Supplier:

Emergency Phone #s

Transportation EMG. Phone #s CANUTEC

HAZARDOUS INGREDIENTS
ACETONE: 99% CAS # 67-64-1
Exposure limits: PPM: OSHA-PEL 750, ACGIH - TLV 750
LD₅₀ Oral rat 9750 MG/KG, Skin rabbit 20 G/KG, LC₅₀ rat 16000 PPM

PHYSICAL DATA
Appearance & Odor: Clear colorless liquid, sweet odor
Vapor pressure: MM HG/20 DEG. c: 184
Vapor density: (AIR 1) 2.0
Solubility in water: 100%
Specific gravity: (Water = 1) 0.79

FIRE AND EXPLOSION DATA
Flammability: 0% F (TCC)
Flammable Limits: LFL 2.0%, UFL 13.0%
Extinguishing Media: water spray, dry chemical, CO₂, alcohol foam
Special equip. & procedures: Self contained breathing apparatus & complete protective clothing. Acetone is extremely flammable, any source of ignition will ignite it. Vapor is extremely explosive.

REACTIVITY DATA
Conditions Contributing to Instability: Heat, Sparks & Open Flame
Hazardous Decomposition Products: Carbon Monoxide, Carbon Dioxide
Hazardous Polymerization: will not occur.

MATERIAL SAFETY DATA SHEET

HEALTH HAZARDS DATA
NOTE: Health studies have shown that exposure to chemicals pose potential risks which may vary from person to person. Exposure to liquids, vapors, mists or fumes should be minimized.

PRINCIPAL HEALTH HAZARDS
Skin contact: contact will dry skin, irritate skin, dermatitis
Eye contact: irritation and may burn eye
Ingestion: large quantities causes headaches, nausea, vomiting. Can also cause liver and kidney damage.
Inhalation: may cause headaches, nausea, vomiting, dizziness, other central nervous system effects, (ie: convulsions)

FIRST AID PROCEDURES
Skin: Avoid direct contact with this chemical, wash with soap and water, seek medical attention if a rash persists.
Eyes: Flush with warm water for 20 minutes, obtain medical attention immediately.
Ingestion: If conscious, immediately induce vomiting by giving 2 glasses of water and sticking a finger down the throat. Get medical attention immediately.
Inhalation: Remove to fresh air. Give A/R if not breathing, get immediate medical attention.

PREVENTATIVE MEASURES
Skin: Wear impervious gloves (butyl rubber), coveralls and safety footwear.
Eyes: Chemical proof goggles or full face respirator if vapors cause eye discomfort.
Ingestion: Wash thoroughly before consuming food stuffs.
Inhalation: Use only in well ventilated areas or use NIOSH approved respiratory protection with organic vapor cartridges.

CONTROL MEASURES AND PRECAUTIONS
Keep container tightly closed. DO NOT consume food, drink or tobacco in work or material storage areas. Flame or any source of ignition is to be kept away from this product. Use caution and personal cleanliness to avoid skin and eye contact. Avoid breathing vapors.

SPILL, LEAK AND DISPOSAL METHODS
** Review Fire and Explosion Hazards and Safety Precautions before proceeding with cleanup. Restrict access to area. Remove all sources of ignition and ventilate area. Absorb spill with an absorbent material such as vermiculite or
MSDS information

• Names of hazardous chemicals in a product
  Acetone

• Physical and chemical properties of the product
  Flammable & highly volatile

• Physical hazards of working with the product
  Burns

• Health hazards of working with the product (including signs and symptoms of overexposures)
  Headache, eye irritation, skin rash
MSDS information

- The main way the chemical enters the body
- The legal limit allowed in air
- If the chemical is a carcinogen
- Precautions for safe use of the hazardous chemical

**Inhalation**

- **Limit:** 750 ppm
- **Carcinogen:** No

Use with adequate ventilation, keep away from open flame
MSDS information

- Exposure control methods, including personal protective equipment
- Emergency and first aid procedures
- The date the MSDS was prepared or revised
- Name, address and phone number of the person responsible for the information in the MSDS

- Wear respirator, rubber gloves
- Eyes: flush with water for 20 minutes
- 1996
- John Doe 1234 Maple St. Anywhere, USA
TFREC MSDSs

• Your supervisor will show you the location of MSDSs used by your program.

• MSDSs for all chemicals used at TFREC are kept in the library (photocopy room – Overley bldg room 101)
Protect yourself!

• Know the product you are working with

• Maintain machinery and equipment to prevent leaks and releases

• Use the smallest amount of chemical to do the job
Protect yourself!

• Use adequate ventilation to reduce the amount of chemicals in the air

• Keep lids, doors or covers closed on chemical processes

• Wear personal protective equipment (PPE)
Protect yourself!

• Inform your supervisor of unusual odors, spills or releases

• If there is a large spill or chemical release, LEAVE THE AREA immediately
  • Notify your supervisor
  • Notify Plant Services
    Jerry Moreland (x 240) or 509-670-3557
Protect yourself!

• Unless you have received special training, do NOT enter an orchard during the restricted entry interval (REI)

• For pesticides in general:
  • CAUTION label, REI = 24 hours
  • DANGER label, REI = 48 hours

• Some chemicals have REIs of 4 or 5 DAYS

• Check the website for REIs before you go: http://www.tfrec.wsu.edu/pages/Admin/Pesticide_Applications
TFREC pesticide applications with re-entry periods

Applications are sorted with most recent ones at top. Applications still within the re-entry period are highlighted in red; any scheduled in the future in yellow.

Please ignore any entries that are marked JT and TEST

Monday, May 7, 2012; 3:59pm

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<th>Date/Time</th>
<th>Block</th>
<th>Materials</th>
<th>Re-entry period</th>
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<td>Sunrise - Blocks 1 a-d</td>
<td>YT-669, Regulaid and Fontelis</td>
<td>24 hours</td>
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Pesticide exposure symptoms

Symptoms often appear within minutes, but could take longer to develop.

- Headache
- Tears in the eyes
- Runny nose
- Increased saliva
- Vomiting
- Diarrhea
- Sweating
- General weakness
- Fatigue
- Muscle twitching
- Abdominal pain or cramps
- Constricted pupils
- Dizziness
- Seizures
- Shallow breathing
- Not breathing
If you have been exposed and feel sick

• Let your supervisor know
• Find out what the chemical was
• Follow the first aid directions in the MSDS
• Get medical attention as needed
• Check your PPE before going back to the area
TFREC provides exposure protection

- Laboratory fume hoods
- PPE
  - Gloves
  - Lab coats
  - Coveralls
  - Hearing protection
  - Respirators
  - Goggles
  - Rubber boots
- Locker and shower facilities
- Washing machine for contaminated clothing
Work SMART!

• **YOU** are the first line of defense
  • Reduce exposure with:
    • Engineering controls
    • Fume hoods
    • Dust abatement
  • Good work practices
    • Know the signs of exposure
    • Minimize contact time
    • Obey re-entry interval (REI) for orchard work

• **PPE** = last line of defense