Right to Know

Hazardous Substance Fact Sheet

Common Name: **HEXACHLOROCYCLOHEXANE (mixed isomers)**

Synonyms: BHC/HCH; 1,2,3,4,5,6-Benzenehexachloride

Chemical Name: Cyclohexane, 1,2,3,4,5,6-Hexachloro-

Date: October 2008

CAS Number: 608-73-1

RTK Substance Number: 3334

DOT Number: UN 2761

EMERGENCY RESPONDERS >>>> SEE BACK PAGE

Description and Use

Hexachlorocyclohexane is a white, yellowish or brownish flake or crystalline (sand-like) powder with a musty odor. It is used as an insecticide.

This fact sheet can be used for the following isomers:

alpha-Hexachlorocyclohexane CAS: 319-84-6 (RTK # 0566)
beta-Hexachlorocyclohexane CAS: 319-85-7 (RTK # 0567)
delta-Hexachlorocyclohexane CAS: 319-86-8 (RTK # 3013)
epsilon-Hexachlorocyclohexane CAS: 6108-10-7(RTK # 3610)

Reasons for Citation

- **Hexachlorocyclohexane** is on the Right to Know Hazardous Substance List because it is cited by DOT, NTP, DEP, IARC, IRIS and EPA.
- This chemical is on the Special Health Hazard Substance List.

SEE GLOSSARY ON PAGE 5.

FIRST AID

Eye Contact

- Immediately flush with large amounts of water for at least 15 minutes, lifting upper and lower lids. Remove contact lenses, if worn, while rinsing.

Skin Contact

- Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.

Inhalation

- Remove the person from exposure
- Begin rescue breathing (using universal precautions) if breathing has stopped and CPR if heart action has stopped.
- Transfer promptly to a medical facility.

EMERGENCY NUMBERS

Poison Control: 1-800-222-1222
CHEMTREC: 1-800-424-9300
NJDEP Hotline: 1-877-927-6337
National Response Center: 1-800-424-8802

Hazard Summary

Hazard Rating	NJDOH	NFPA
HEALTH	2	-
FLAMMABILITY	0	-
REACTIVITY	0	-
CARCINOGEN POISONOUS GASES ARE PRODUCED IN FIRE		

Hazard Rating Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe

- **Hexachlorocyclohexane** can affect you when inhaled and may be absorbed through the skin.
- **Hexachlorocyclohexane** should be handled as a CARCINOGEN--WITH EXTREME CAUTION.
- Contact can irritate the skin and eyes.
- Inhaling **Hexachlorocyclohexane** can irritate the nose, throat and lungs.
- Repeated exposure to **Hexachlorocyclohexane** can cause headache, nausea, vomiting, dizziness and convulsions.
- **Hexachlorocyclohexane** may damage the liver and kidneys.
- **Hexachlorocyclohexane** may cause abnormal heart rhythm (arrhythmia).
- **Hexachlorocyclohexane** does not burn, however, it is often dissolved in a liquid carrier which may be flammable or combustible.

Workplace Exposure Limits

The following exposure limits are for *Lindane* (measured as *gamma-Hexachlorocyclohexane*):

OSHA: The legal airborne permissible exposure limit (PEL) is **0.5 mg/m^3** averaged over an 8-hour workshift.

NIOSH: The recommended airborne exposure limit (REL) is **0.5 mg/m^3** averaged over a 10-hour workshift.

ACGIH: The threshold limit value (TLV) is **0.5 mg/m^3** averaged over an 8-hour workshift.

- **Hexachlorocyclohexane** may be a CARCINOGEN in humans. There may be no safe level of exposure to a carcinogen, so all contact should be reduced to the lowest possible level.
- The above exposure limits are for air levels only. When skin contact also occurs, you may be overexposed, even though air levels are less than the limits listed above.

Determining Your Exposure

- Read the product manufacturer's Material Safety Data Sheet (MSDS) and the label to determine product ingredients and important safety and health information about the product mixture.
- For each individual hazardous ingredient, read the New Jersey Department of Health Hazardous Substance Fact Sheet, available on the RTK website (www.nj.gov/health/eoh/rtkweb) or in your facility's RTK Central File or Hazard Communication Standard file.
- You have a right to this information under the New Jersey Worker and Community Right to Know Act, the Public Employees Occupational Safety and Health (PEOSH) Act if you are a public worker in New Jersey, and under the federal Occupational Safety and Health Act (OSHA) if you are a private worker.
- The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard (29 CFR 1910.1200) and the PEOSH Hazard Communication Standard (N.J.A.C. 12:100-7) require employers to provide similar information and training to their employees.

This Fact Sheet is a summary of available information regarding the health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

Health Hazard Information

Acute Health Effects
The following acute (short-term) health effects may occur immediately or shortly after exposure to **Hexachlorocyclohexane**:

- Contact can irritate the skin and eyes.
- Inhaling **Hexachlorocyclohexane** can irritate the nose, throat and lungs causing coughing, wheezing and/or shortness of breath.
- Repeated exposure to **Hexachlorocyclohexane** can cause headache, nausea, vomiting, dizziness and seizures, muscle weakness and twitching, and convulsions.

Chronic Health Effects
The following chronic (long-term) health effects can occur at some time after exposure to **Hexachlorocyclohexane** and can last for months or years:

Cancer Hazard
- **Hexachlorocyclohexane** may be a CARCINOGEN in humans since it has been shown to cause liver cancer in animals.
- Many scientists believe there is no safe level of exposure to a carcinogen.

Reproductive Hazard
- There is limited evidence that **Hexachlorocyclohexane** may damage the developing fetus, damage the male and female reproductive systems, and affect fertility in animals.

Other Effects
- **Hexachlorocyclohexane** may damage the liver and kidneys.
- **Hexachlorocyclohexane** may cause abnormal heart rhythm (arrhythmia).

Medical

Medical Testing
For frequent or potentially high exposure (half the PEL or greater), the following are recommended before beginning work and at regular times after that:

- Liver and kidney function tests

If symptoms develop or overexposure is suspected, the following are recommended:

- Exam of the nervous system
- EKG

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under the OSHA Access to Employee Exposure and Medical Records Standard (29 CFR 1910.1020).

Mixed Exposures
- More than light alcohol consumption can cause liver damage. Drinking alcohol may increase the liver damage caused by **Hexachlorocyclohexane**.

Workplace Controls and Practices

Very toxic chemicals, or those that are reproductive hazards or sensitizers, require expert advice on control measures if a less toxic chemical cannot be substituted. Control measures include: (1) enclosing chemical processes for severely irritating and corrosive chemicals, (2) using local exhaust ventilation for chemicals that may be harmful with a single exposure, and (3) using general ventilation to control exposures to skin and eye irritants. For further information on workplace controls, consult the NIOSH document on Control Banding at www.cdc.gov/niosh/topics/ctrlbanding/.

The following work practices are also recommended:

- Label process containers.
- Provide employees with hazard information and training.
- Monitor airborne chemical concentrations.
- Use engineering controls if concentrations exceed recommended exposure levels.
- Provide eye wash fountains and emergency showers.
- Wash or shower if skin comes in contact with a hazardous material.
- Always wash at the end of the workshift.
- Change into clean clothing if clothing becomes contaminated.
- Do not take contaminated clothing home.
- Get special training to wash contaminated clothing.
- Do not eat, smoke, or drink in areas where chemicals are being handled, processed or stored.
- Wash hands carefully before eating, smoking, drinking, applying cosmetics or using the toilet.

In addition, the following may be useful or required:

- Use a vacuum or a wet method to reduce dust during clean-up. DO NOT DRY SWEEP.
- Use a high efficiency particulate air (HEPA) filter when vacuuming. Do not use a standard shop vacuum.

Personal Protective Equipment

The OSHA Personal Protective Equipment Standard (29 CFR 1910.132) requires employers to determine the appropriate personal protective equipment for each hazard and to train employees on how and when to use protective equipment.

The following recommendations are only guidelines and may not apply to every situation.

Gloves and Clothing

- Avoid skin contact with **Hexachlorocyclohexane**. Wear personal protective equipment made from material which can not be permeated or degraded by this substance. Safety equipment suppliers and manufacturers can provide recommendations on the most protective glove and clothing material for your operation.
- Safety equipment manufacturers recommend Nitrile, Polyvinyl Alcohol, Silver Shield®/4H® and Viton gloves for *Halogen compounds*, *Benzylic* and DuPont Tyvek®, or the equivalent, as a protective material for clothing.
- All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.

Eye Protection

- Wear eye protection with side shields or goggles.
- Wear a face shield along with goggles when working with corrosive, highly irritating or toxic substances.

Respiratory Protection

Improper use of respirators is dangerous. Respirators should only be used if the employer has implemented a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing, and medical exams, as described in the OSHA Respiratory Protection Standard (29 CFR 1910.134).

- For field applications check with your supervisor and your safety equipment supplier regarding the appropriate respiratory equipment.
- Where the potential exists for exposure over **0.5 mg/m^3**, use a NIOSH approved respirator with an organic vapor cartridge and particulate prefilters. Increased protection is obtained from full facepiece powered-air purifying respirators.
- Leave the area immediately if (1) while wearing a filter or cartridge respirator you can smell, taste, or otherwise detect **Hexachlorocyclohexane**, (2) while wearing particulate filters abnormal resistance to breathing is experienced, or (3) eye irritation occurs while wearing a full facepiece respirator. Check to make sure the respirator-to-face seal is still good. If it is, replace the filter or cartridge. If the seal is no longer good, you may need a new respirator.
- Consider all potential sources of exposure in your workplace. You may need a combination of filters, prefilters or cartridges to protect against different forms of a chemical (such as vapor and mist) or against a mixture of chemicals.
- Where the potential exists for exposure over **5 mg/m^3**, use a NIOSH approved supplied-air respirator with a full facepiece operated in a pressure-demand or other positive-pressure mode. For increased protection use in combination with an auxiliary self-contained breathing apparatus operated in a pressure-demand or other positive-pressure mode.
- Exposure to **50 mg/m^3** is immediately dangerous to life and health. If the possibility of exposure above **50 mg/m^3** exists, use a NIOSH approved self-contained breathing apparatus with a full facepiece operated in a pressure-demand or other positive-pressure mode equipped with an emergency escape air cylinder.

Fire Hazards

If employees are expected to fight fires, they must be trained and equipped as stated in the OSHA Fire Brigades Standard (29 CFR 1910.156).

- **Hexachlorocyclohexane** does not burn, however, it is often dissolved in a liquid carrier which may be flammable or combustible.
- Use dry chemical, CO_2, water spray or foam as extinguishing agents.
- POISONOUS GASES ARE PRODUCED IN FIRE, including *Phosgene*, *Chlorine* and *Hydrogen Chloride*.
- Use water spray to keep fire-exposed containers cool.

Spills and Emergencies

If employees are required to clean-up spills, they must be properly trained and equipped. The OSHA Hazardous Waste Operations and Emergency Response Standard (29 CFR 1910.120) may apply.

If **Hexachlorocyclohexane** is spilled, take the following steps:

- Evacuate personnel and secure and control entrance to the area.
- Eliminate all ignition sources.
- Moisten spilled material first or use a HEPA-filter vacuum for clean-up and deposit into sealed containers.
- Ventilate and wash area after clean-up is complete.
- DO NOT wash into sewer.
- It may be necessary to contain and dispose of **Hexachlorocyclohexane** as a HAZARDOUS WASTE. Contact your state Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.

Handling and Storage

Prior to working with **Hexachlorocyclohexane** you should be trained on its proper handling and storage.

- **Hexachlorocyclohexane** in contact with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) may result in fires and explosions.
- **Hexachlorocyclohexane** is not compatible with ALKALI METALS (such as LITHIUM, SODIUM and POTASSIUM); REDUCING AGENTS; STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); AMINES; AZO and DIAZO COMPOUNDS; NITRIDES (such as AMMONIA and CYANOGEN); and EPOXIDES.
- Store in tightly closed containers in a cool, well-ventilated area.
- **Hexachlorocyclohexane** may be corrosive to METALS.

Occupational Health Information Resources

The New Jersey Department of Health offers multiple services in occupational health. These services include providing informational resources, educational materials, public presentations, and industrial hygiene and medical investigations and evaluations.

For more information, please contact:

New Jersey Department of Health
Right to Know
PO Box 368
Trenton, NJ 08625-0368
Phone: 609-984-2202
Fax: 609-984-7407
E-mail: rtk@doh.state.nj.us
Web address: http://www.nj.gov/health/eoh/rtkweb

The Right to Know Hazardous Substance Fact Sheets are not intended to be copied and sold for commercial purposes.

GLOSSARY

ACGIH is the American Conference of Governmental Industrial Hygienists. They publish guidelines called Threshold Limit Values (TLVs) for exposure to workplace chemicals.

Acute Exposure Guideline Levels (AEGLs) are established by the EPA. They describe the risk to humans resulting from once-in-a lifetime, or rare, exposure to airborne chemicals.

Boiling point is the temperature at which a substance can change its physical state from a liquid to a gas.

A **carcinogen** is a substance that causes cancer.

The **CAS number** is unique, identifying number, assigned by the Chemical Abstracts Service, to a specific chemical.

CFR is the Code of Federal Regulations, which are the regulations of the United States government.

A **combustible** substance is a solid, liquid or gas that will burn.

A **corrosive** substance is a gas, liquid or solid that causes destruction of human skin or severe corrosion of containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

ERG is the Emergency Response Guidebook. It is a guide for emergency responders for transportation emergencies involving hazardous substances.

Emergency Response Planning Guideline (ERPG) values are intended to provide estimates of concentration ranges where one reasonably might anticipate observing adverse effects.

A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

IARC is the International Agency for Research on Cancer, a scientific group.

Ionization Potential is the amount of energy needed to remove an electron from an atom or molecule. It is measured in electron volts.

IRIS is the Integrated Risk Information System database maintained by federal EPA. The database contains information on human health effects that may result from exposure to various chemicals in the environment.

LEL or **Lower Explosive Limit**, is the lowest concentration of a combustible substance (gas or vapor) in the air capable of continuing an explosion.

mg/m^3 means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

A **mutagen** is a substance that causes mutations. A **mutation** is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the federal Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

PEOSHA is the New Jersey Public Employees Occupational Safety and Health Act, which adopts and enforces health and safety standards in public workplaces.

Permeated is the movement of chemicals through protective materials.

PIH is a DOT designation for chemicals which are Poison Inhalation Hazards.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A **reactive** substance is a solid, liquid or gas that releases energy under certain conditions.

STEL is a Short Term Exposure Limit which is usually a 15-minute exposure that should not be exceeded at any time during a work day.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

UEL or **Upper Explosive Limit** is the highest concentration in air above which there is too much fuel (gas or vapor) to begin a reaction or explosion.

Vapor Density is the ratio of the weight of a given volume of one gas to the weight of another (usually *Hydrogen*), at the same temperature and pressure.

The **vapor pressure** is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

Right to Know Hazardous Substance Fact Sheet

Emergency Responders Quick Reference

Common Name: **HEXACHLOROCYCLOHEXANE (mixed isomers)**

Synonyms: BHC/HCH; 1,2,3,4,5,6-Benzenehexachloride
CAS No: 608-73-1
Molecular Formula: $C_6H_6Cl_6$
RTK Substance No: 3334
Description: White, yellowish or brownish flake or crystalline powder with a musty odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
2 - Health **0 - Fire** **0 - Reactivity** **DOT#:** UN 2761 **ERG Guide #:** 151 **Hazard Class:** 6.1 (Poison)	**Hexachlorocyclohexane** does not burn, however, it is often dissolved in a liquid carrier which may be flammable or combustible. Use dry chemical, CO_2, water spray or foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, Including *Phosgene*, *Chlorine* and *Hydrogen Chloride*. Use water spray to keep fire-exposed containers cool.	**Hexachlorocyclohexane** in contact with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) may result in fires and explosions. **Hexachlorocyclohexane** is not compatible with ALKALI METALS (such as LITHIUM, SODIUM and POTASSIUM); REDUCING AGENTS; STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); AMINES; AZO and DIAZO COMPOUNDS; NITRIDES (such as AMMONIA and CYANOGEN); and EPOXIDES.

SPILL/LEAKS

Isolation Distance:

Spills: 25 meters (75 feet)

Fires: 800 meters (1/2 mile)

Moisten spilled material first or use a HEPA-filter vacuum for clean-up and deposit into sealed containers.

DO NOT wash into sewer.

Hexachlorocyclohexane (mixed isomers) is toxic to aquatic organisms and bioaccumulates.

PHYSICAL PROPERTIES

Odor Threshold:	Musty odor
Flash Point:	Noncombustible *solid*
Vapor Density:	1.85 (air = 1)
Vapor Pressure:	0.5 mm Hg at 140°F (60°C)
Specific Gravity:	1.67 (water = 1)
Water Solubility:	Insoluble
Melting Point:	149°F (65°C)
Molecular Weight:	291

EXPOSURE LIMITS

OSHA:	0.5 mg/m^3, 8-hr TWA
NIOSH:	0.5 mg/m^3, 10-hr TWA
ACGIH:	0.5 mg/m^3, 8-hr TWA
IDLH:	50 mg/m^3 (All of the above are for *gamma-Hexachlorocyclohexane*)

PROTECTIVE EQUIPMENT

Gloves:	Nitrile, Polyvinyl Alcohol, Silver Shield®/4H® and Viton (>8-hr breakthrough for *Halogen compounds*, *Benzylic*)
Coveralls:	DuPont Tyvek®
Respirator:	>0.5 mg/m^3 - full facepiece APR with Organic vapor filter and High efficiency prefilters >5 mg/m^3 - Supplied air

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath Headache, nausea, vomiting, dizziness, muscle weakness and convulsions
Chronic:	Cancer (liver) in animals

FIRST AID AND DECONTAMINATION

Remove the person from exposure.

Flush eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.

Quickly remove contaminated clothing. Wash contaminated skin with large amounts of soap and water.

Begin artificial respiration if breathing has stopped and CPR if necessary.

Transfer promptly to a medical facility