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Chemical Category	2,4-DICHLOROPHENOL		

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OFFICE OF TOXIC SUBSTANCES
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8EHQ-98-14302

Attn: Section 8(e) and Ms. Leslie Scott

Re: 8EHQ-1098-14302 & 8EHQ-0500-14302
Response to EPA Letter dated October 6, 2000 and signed by Richard H. Heffer, Chief
High Producer, Volume Chemicals Branch

Dear Sir/Madam and Ms. Scott:

Enclosed for your information is a revised copy of the booklet entitled "2,4-Dichlorophenol Safe Handling Guide" and a revised Material Safety Data Sheet for 2,4-Dichlorophenol (DCP). Dow AgroSciences, a wholly owned subsidiary of The Dow Chemical Company, revised its DCP Safe Handling Guide and the Material Safety Data Sheet (MSDS) to address the issues raised by the EPA/OSHA Chemical Advisory on DCP (issued February 15, 2000).

Dow AgroSciences has informed and trained those workers with the potential for exposure to DCP (including workers in the waste handling and maintenance operations) on the revised safe handling and decontamination procedures for DCP. Dow AgroSciences has also informed and trained the local hospital and emergency response personnel on the appropriate first aid and decontamination procedures for DCP.

Dow AgroSciences has provided copies of the revised Safe Handling Guide and MSDS to its external customer base and other industry representatives involved in the manufacture of DCP. Dow AgroSciences had sent copies of the EPA/OSHA Advisory to these external customers, as well as, made presentations through the 2,4-D Task Force to promote the safe handling of DCP. At this time, Dow AgroSciences does not have any active DCP customers. Dow AgroSciences, however, will ensure that any future DCP customers receive copies of the Safe Handling Guide, MSDS, and the EPA/OSHA Advisory.

As part of our ongoing commitment to provide product information, the revised DCP Safe Handling Guide and MSDS may also be obtained from our company web site, www.dowagro.com (click on the label/MSDS button at the bottom of the page). Please contact me if you have additional questions regarding Dow AgroSciences product stewardship activities.

Sincerely,


Jane Ann Stautz
Global EH&S Product Leader
Phone: 317-337-4885
Email: jastautz@dowagro.com

Contains No Confidential Information



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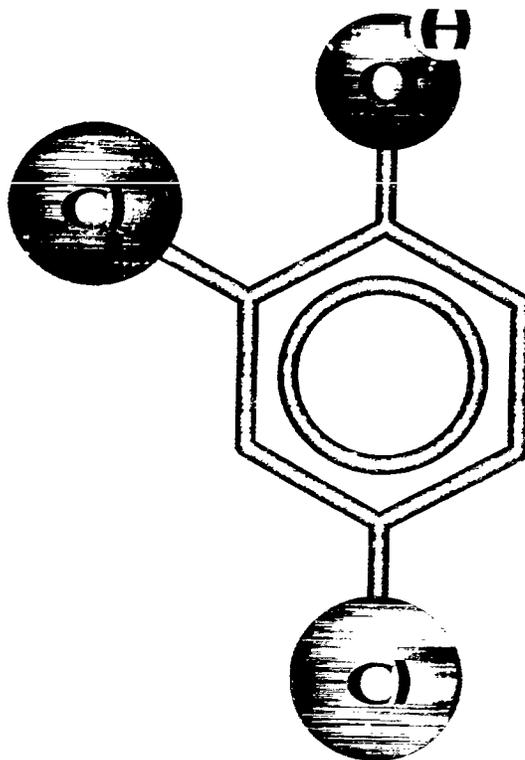
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CONTAINS NO CONFIDENTIAL BUSINESS INFORMATION

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2,4-DICHLOROPHENO

SAFE HANDLING GUIDE



2,4-Dichlorophenol Safe Handling Guide

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Introduction

2,4-Dichlorophenol (DCP) is an important intermediate in the manufacture of 2,4-dichlorophenoxyacetic acid (2,4-D), the well-known industrial commodity herbicide. It is also used in the manufacture of other pesticide products and pharmaceuticals.

As an acknowledged leader in the production of DCP, Dow AgroSciences is firmly committed to advancing and maintaining the highest standards of purity, quality, and safety. Because DCP can pose significant health hazards, safe-handling procedures must be observed, and all personnel working with this product must be well trained. For new customer sites, Dow AgroSciences requires and provides a site stewardship assessment prior to the first shipment of product.

Personnel Training

Personnel handling 2,4-dichlorophenol must understand its hazards, must be trained to avoid those hazards, and must be given specific instructions concerning the personal protective equipment required for particular situations. Safety equipment must be readily available and properly maintained. Workers must be trained in procedures to follow if exposure occurs.

The emphasis should be on preventing exposure, not reacting to an exposure. Safety procedures and material safety data sheets (MSDS) must be reviewed with workers according to OSHA Hazard Communication Standard 29 CFR 1910.1200. The entire training program must be documented in writing, and records must be kept of individual participation.

Physical Properties

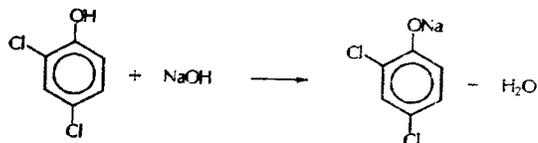
DCP is a white, crystalline solid at room temperature. When molten, it is a colorless liquid. It has a strong phenolic odor, which serves as a good indicator of its presence.

DCP Physical Properties

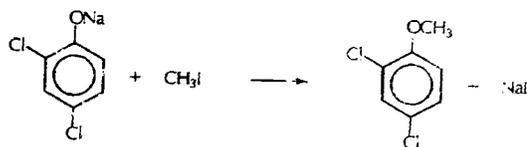
Freezing Point	108°F/42°C
Boiling Point	419°F/215°C
Vapor Pressure @ 20°C	0.10 mm Hg
Vapor Density (Air = 1)	5.6
Water Solubility	0.45 g/100 g
Specific Gravity (60°C/4°C)	1.382
Molecular Weight	163
Flash Point (TCC)	219°F/104°C

Chemistry and End Uses

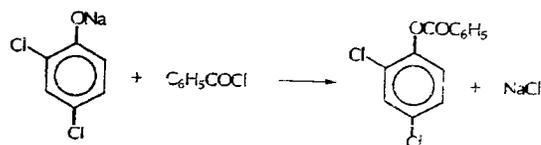
DCP exhibits two major types of reactivity: reactions of the phenolic -OH group and electrophilic substitution in the aromatic ring. The most important type of reactivity is related to the acidity of the -OH group. DCP reacts with bases to form salts. For example, reaction with sodium hydroxide yields the sodium salt of DCP.



The sodium salt of DCP can then react further with alkyl halides or sulfates to form 2,4-dichlorophenyl ethers. For example, reaction with methyl iodide yields 2,4-dichloroanisole.



The sodium salt of DCP also reacts readily with acid chlorides or acid anhydrides to produce esters. For example, reaction with benzoyl chloride yields 2,4-dichlorophenyl benzoate.



An example of electrophilic ring substitution in 2,4-dichlorophenol is the reaction with chlorine, which yields 2,4,6-trichlorophenol.



End Uses

DCP and its alkali salts are used in the manufacture of a wide variety of chemical products. A common end use for DCP is in the production of phenoxy herbicides. For instance, the sodium salt of DCP is reacted with sodium chloroacetate to produce 2,4-dichlorophenoxyacetic acid, commonly known as 2,4-D. Additional applications for chemicals derived from DCP include pharmaceuticals, fungicides, and insecticides.

Hazards

In the interest of environmental and personal safety and in compliance with hazard communication policies, Dow AgroSciences supplies an MSDS for DCP. All personnel should read this information carefully and understand the potential hazards associated with DCP before handling it. In addition, all applicable federal, state, and local health and safety laws and regulations should be followed.

MSDS

To display or print a copy of the dichlorophenol MSDS from the Dow AgroSciences web site, visit www.dowagro.com, click on the "U.S. Label and MSDS System" link on the home page, and follow the on-screen instructions.

To obtain copies of the MSDS by fax, please call the Dow AgroSciences self-service document center.

1-800-891-9157

If you are in California, call 1-888-847-6858 for the document center.

Copies of the MSDS can also be ordered by telephone from Dow AgroSciences Customer Service.

1-317-337-7850

Stability and Reactivity

DCP is stable under normal handling and storage conditions. However, the product can decompose at elevated temperatures. Hydrochloric acid and other toxic, irritating products can be produced if DCP is burned.

Corrosivity

DCP is moderately corrosive. The suggested material of construction for handling solid and liquid DCP is carbon steel. Copper is corroded by DCP at elevated temperatures and is therefore not recommended for use. Moisture in DCP increases the potential for corrosion, therefore rendering carbon steel inadequate as a material of construction. If the DCP contains moisture, materials such as Hastelloy C or Monel, which contain a greater nickel content, should be used. Stainless steel should be avoided due to the potential for stress-corrosion cracking.

Physical Hazards

Eye: Direct contact can cause severe irritation with corneal injury, which could result in permanent impairment of vision, even blindness. Handling DCP at elevated temperatures can generate vapor levels sufficient to cause eye irritation. Contact with heated material can also cause thermal burns.

Skin: DCP is more readily absorbed through the skin when in solution and especially when molten. Molten or hot DCP is immediately absorbed through the skin in amounts that have caused death to humans. Rapid death in humans has been caused by skin exposure without immediate decontamination. Amounts of molten DCP that cover as little as 1% body surface area (e.g., palm-of-hand-sized) could result in death.

Ingestion: Small amounts of DCP that might be swallowed incidental to normal handling operations are unlikely to cause injury. However, swallowing large amounts could cause injury. Ingestion can also cause chemical burns of the mouth and throat.

Inhalation: Although the formation of DCP dust is unlikely, such dust can result in severe irritation in the upper respiratory tract (nose and throat). Elevated temperatures can generate vapor levels sufficient to cause respiratory irritation.

Handling Precautions

Because of the hazards associated with DCP, constant care must be exercised, and adequate protective measures and equipment fully utilized to avoid harmful effects to personnel or the environment. Written procedures for handling DCP in all applicable operations should also be established. A self-contained system with dry-break connections and sufficient ventilation is recommended in areas where potential exposure can occur. Use extreme caution when handling hot or molten DCP. *Molten or hot DCP is immediately absorbed through the skin in amounts that have caused death to humans. Rapid death in humans has been caused by skin exposure without immediate decontamination. Amounts of molten DCP that cover as little as 1% body surface area (e.g., palm-of-hand-sized) could result in death.*

Protective Measures and Equipment

See *First Aid* section on page 4 for decontamination guidelines.

The sharp, pungent odor and low odor threshold of DCP provide good early warning properties of the presence of DCP. Adequate ventilation should be provided to control airborne concentrations below exposure guidelines when handling DCP.

Exposure Limits

Dow AgroSciences' Industrial Hygiene Guideline (IHG) for DCP is 1 ppm. The IHG is based upon an 8-hour time-weighted average exposure by vapor inhalation. It should also be noted that inhalation might not be the only route of exposure. Skin contact is another potential exposure route, and molten or hot DCP can be immediately absorbed through the skin in amounts that have caused rapid death in humans. Absorption through skin accelerates with temperature such that additional measures to minimize exposure to hot or molten DCP should be considered.

Respiratory Protection

When DCP levels are below the exposure guideline, personnel in areas where the material is stored or used should not need to use respiratory protection. However, if personnel are handling DCP at elevated temperatures (when vapors are likely to be generated) without sufficient ventilation, or if respiratory irritation is experienced, use of a NIOSH-approved, full-face, air-purifying respirator for organic vapors is recommended. Suitable positive-pressure, self-contained breathing apparatus should be used for longer-term exposure in emergency situations, such as spill clean-ups, or in situations when the atmospheric level is unknown.

Face and Eye Protection

For normal operations, chemical goggles should be worn, along with hard hats. For situations in which the potential for exposure is greater, a face shield is also recommended. When handling DCP at elevated temperatures without sufficient ventilation, the use of a NIOSH-approved, full-face, air-purifying respirator for organic vapors is recommended.

Protective Clothing

When the potential for exposure exists, Dow AgroSciences recommends protective clothing impervious to DCP. The following personal protective clothing is recommended: neoprene or nitrile gloves; neoprene boots; and Saranex, neoprene, or Kapler CPF3 full-body suit. Use DCP-impervious gloves at all times. When needed, use gloves insulated for thermal protection. Selection of specific personal protective equipment—such as face shield, boots, apron, or full-body suit—will depend on the operations being undertaken.

Safety Showers and Eyebaths

Safety showers and eyebaths are essential in any operation involving DCP. They should be located in the immediate work area and readily accessible to personnel. Both should be tested routinely and frequently to ensure proper operation.

First Aid

Because of the toxicity of DCP, prompt action after exposure is necessary to minimize harm to personnel. Emergency first-aid procedures should be covered thoroughly and reviewed frequently in worker training sessions. If you need help in planning or conducting such training, your Dow AgroSciences representative can assist you with more detailed information.

Note: First aid responders should pay attention to self-protection and use the recommended personal protective equipment (chemical resistant gloves, splash protection).

Eyes

Use an eyebath immediately, and irrigate eyes continuously in flowing water for at least 30 minutes. Prompt medical attention is essential.

Skin

Enter the safety shower and immediately wash thoroughly any size exposure with nonabrasive soap and large quantities of water for 30 minutes, while removing contaminated clothing and footwear.

It is recommended that further amounts of DCP be removed from the skin by repeatedly spraying/swabbing with a polyethylene glycol or polypropylene glycol mixture, alternating with rinsing with large quantities of water for 30 minutes. Examples of decontamination mixtures include a 2:1 ratio of PEG300/ethanol (or industrial methylated spirits), available polypropylene/rapeseed oil proprietary mixtures, or polyvinylpyrrolidone/detergent mixtures.

An option available in the U.S. is D-TAM® Safe Solvent (Colorometric Labs, Des Plaines, IL; 847-803-3737). Used undiluted, it is effective in removing DCP from the skin. Apply gently to avoid abrading injured skin and promptly rinse with water for 1 to 2 minutes. If water is unavailable, wipe the material off with a paper towel. Follow up with repeated applications and rinse (or wipe) for 30 minutes.

A companion product, D-TAM Skin Cleanser, which also contains propylene glycol and emulsifiers, has similar efficacy and is relatively interchangeable with D-TAM Safe Solvent.

Prompt medical attention is essential. Rapid death in humans has resulted from skin exposure to hot or molten DCP without immediate decontamination.

Ingestion

Do not induce vomiting. Give large amounts of water or milk if available. Promptly transport individual to a medical facility. Do not give anything by mouth to an unconscious person.

Inhalation

Remove to fresh air quickly if any ill effects occur. Consult a physician.

Contaminated Materials

Destroy and dispose of any items that cannot be decontaminated, such as footwear, belts, watchstraps, etc.

Shipping Information

Containers

DCP can be supplied in bulk containers such as rail cars, tank trucks, or ISO tanks, or it can be packaged in 55-gallon, galvanized-steel drums. Because DCP freezes at 108°F, it is very likely that the shipment you receive from Dow AgroSciences will require some degree of heating before the container can be completely unloaded into your storage system. Prior to unloading operations, review any written procedures that have been established for handling molten DCP. Make sure all personnel unloading the containers are aware that the containers will need to be safely vented to relieve excess pressure resulting from thawing of DCP. Either low-pressure steam or hot water can be used to melt DCP. Caution must be exercised when opening any container of molten DCP. To minimize the risk of exposure to DCP, the following minimum personal protective equipment is recommended: nitrile or neoprene gloves; neoprene boots; Saranex, neoprene, or Kapler CPF3 full-body suit; and face shield. In situations involving potential exposure to DCP vapors, a NIOSH-approved, full-face, air-purifying respirator is recommended.

Bulk Vehicles

All bulk vehicles used for the transportation of DCP must be returned to the Dow AgroSciences DCP production facility for decontamination prior to being released for cleaning. Every effort will be made to use dedicated equipment to minimize the number of vehicles in this service. This practice can affect the scheduling of product shipments.

Special Routing

Dow AgroSciences will use two drivers when molten DCP must be shipped by tank truck. Restricted routing might be required for such shipments. Adequate lead-time is necessary to ensure that appropriate equipment, drivers, and routings are available.

Placarding and Labeling Requirements

Regulations require documentation, labeling, marking, placarding, and package/container approval for materials that meet certain criteria.

The shipping description must include the above information and the emergency response telephone number. Any storage tank for DCP must be properly identified and labeled. Other tank labels required by federal, state, or local regulations must also be installed.

Global Transportation [I.M.D.G.]—Dry or flake: TOXIC SOLIDS, CORROSIVE, ORGANIC, N.O.S. (2,4-DICHLOROPHENOL)/6.1/UN 2928/PG II/RQ (2,4-DICHLOROPHENOL) 100 LBS./MARINE POLLUTANT/EMS 6.1-04/MFAG 711/STCC=4921250

Land [North America]—Dry or flake: TOXIC SOLIDS, CORROSIVE, ORGANIC, N.O.S. (2,4-DICHLOROPHENOL)/6.1/UN 2928/PG II/RQ (2,4-DICHLOROPHENOL) 100 LBS./MARINE POLLUTANT.

Land [North America]—Molten or hot: TOXIC LIQUID, CORROSIVE, ORGANIC, N.O.S. (2,4-DICHLOROPHENOL)/6.1/UN 2927/PG I/RQ (2,4-DICHLOROPHENOL) 100 LBS./MARINE POLLUTANT/HOT.

Labels

To display or print a copy of the dichlorophenol product label from the Dow AgroSciences web site, visit www.dowagro.com, click on the "U.S. Label and MSDS System" link on the home page, and follow the on-screen instructions.

To obtain copies of the product label by fax, please call the Dow AgroSciences self-service document center at 1-800-891-9157. If you are in California, call 1-888-847-3858 for the document center.

Copies of the label can also be ordered by telephone from Dow AgroSciences Customer Service at 1-317-337-7850.

Transportation Emergencies

Contact Dow AgroSciences Emergency Response at 1-800-992-5994 to speak with personnel who will provide advice and arrange for professional help, as needed, to assist with an emergency.

Dow AgroSciences Emergency Response

1-800-992-5994

Sampling, Unloading, and Spill Clean-Up

Sampling

The proper approach for sampling solid DCP depends on the working conditions and type of container or system from which the sample will be obtained. Good judgement should be used to determine the method for obtaining a representative solid sample that minimize the potential for exposure. Chemical goggles and impervious gloves must be worn to obtain the sample.

Sampling hot or molten DCP should be done using a properly designed sampling system. Sampling devices should be placed in enclosures designed to isolate the product from personnel and the environment. Whenever samples are taken using such an enclosure, goggles and neoprene or nitrile gloves must be worn. If an enclosure is not used, full protective clothing (impervious gloves, boots, and suit) and a full-face respirator must be worn. *Direct sampling of hot or molten DCP should be avoided.*

In any case, operating personnel should review all sampling procedures with supervision in advance to determine the best sampling method and proper protective equipment required for the task.

Unloading

Because DCP is a solid at ambient temperatures, tanks containing DCP will need to be thawed prior to unloading. Medium-pressure steam is recommended for melting DCP. The tank should be equipped with steam coils to aid in the thawing process. When unloading molten DCP, use an unloading checklist (see example at right). Review all written procedures established for your facility for unloading DCP from a tank.

Wear appropriate protective equipment, barricade the immediate area, and restrict access. Ensure that safety showers and eyebaths are located nearby and are immediately accessible and operational. Use extreme caution when connecting any unloading lines and steam lines to the tank. Monitor the transfer with another person

in attendance and, after transfer, blow out the unloading line with either nitrogen or dry air.

Unloading System Design

DCP is primarily shipped in top-unload, insulated tanks equipped with dry-disconnect fittings and external steam coils for melting the solid DCP. The use of a pump to unload molten DCP is recommended. A nitrogen pad can be used to help prime the transfer pump. A typical unloading design is shown in Figure 1.

The storage tank should be vented back either to the bulk container or to a scrubber to avoid emissions of DCP. If the tank is vented to a scrubber, the bulk container should be padded with nitro-

SUGGESTED UNLOADING CHECKLIST

Date: _____ Identification #: _____

Material to Unload: _____

Proper protective equipment being worn?

Safety shower and eye bath operational?

Before Unloading:

Shipping container spotted on an unloading containment pad?

Wheels chocked and brakes set if necessary?

Product seals intact?

Dry-disconnect fittings in good condition?

Receipt material identification checked?

Receiving tank level verified?

Contents thawed?

Steam lines disconnected?

Shipping container vented properly?

Ground wire attached?

Barricades and warning signs placed, if needed?

Unloading line connected properly?

Discharge valves open?

Transfer occurring properly?

After Unloading:

Shipping container empty? Verified?

Receiving tank level verified?

All valves closed and capped?

Pump turned off?

Vent piping disconnected?

Unloading line purged?

Unloading line disconnected?

Ground wire removed?

Chocks removed if necessary?

Barricade and warning signs removed?

Dome cover tight?

Spills/leakage cleaned up?

Unloader's Signature _____

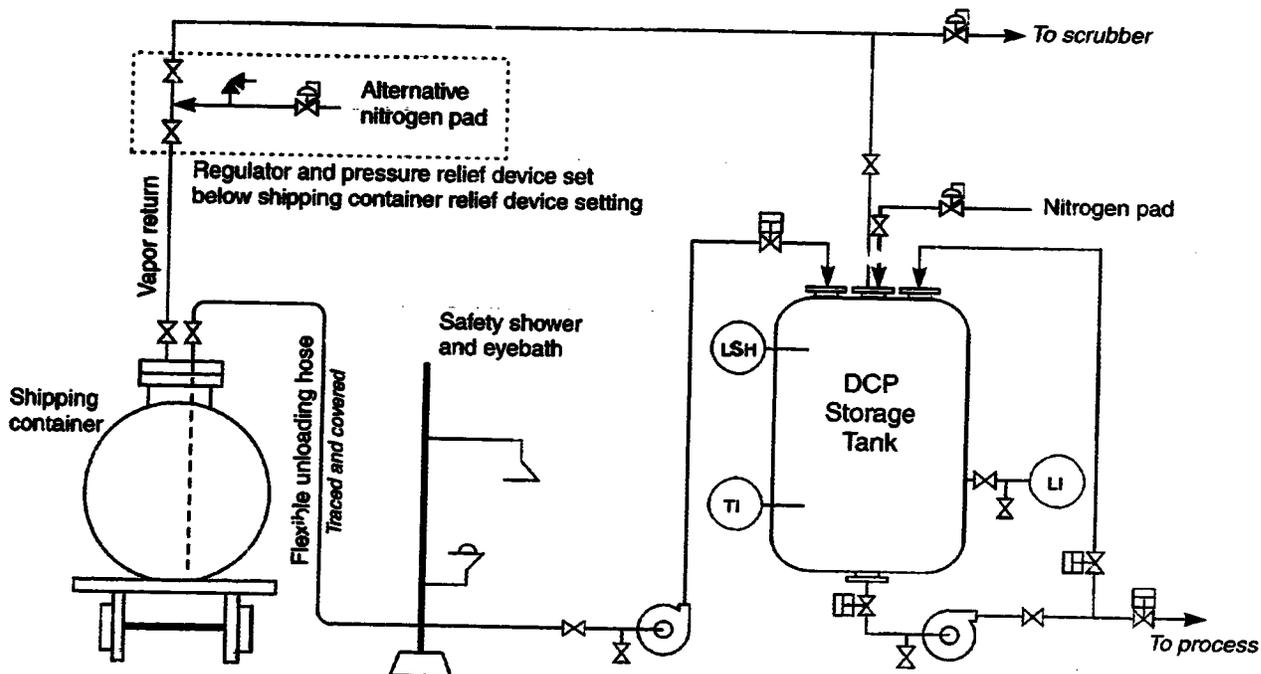


FIGURE 1: Typical DCP unloading and storage system design: top unloading with a pump.

gen. Consideration should be made for purging product from the unloading line to allow for a clean disconnect.

Safety showers and eyebaths should be in the unloading area and should be tested routinely and frequently to ensure proper operation. Consideration should be made to contain leaks and avoid discharging DCP to the environment.

Warning!

Molten DCP leaking through holes in piping, storage, or handling equipment will solidify when exposed to normal ambient temperatures and can plug existing holes. Steam cleaning will melt the product. Precautions (use of all recommended personal protection equipment) must be taken to avoid the potential for exposure from spraying or splashing molten or hot product during clean-up, maintenance, repairs, etc.

For more information on DCP transportation or materials of construction issues, contact your Dow AgroSciences representative.

Spill Clean-Up

Use the recommended personal protective equipment: neoprene or nitrile gloves; neoprene boots; face shield; and Saranex, neoprene, or

Kapler CPF3 full-body suit. Contain small amounts of solid material and scoop into a steel or plastic container for disposal. Do not use water to wash down spill area.

For molten DCP, wear full personal protective equipment (neoprene or nitrile gloves; neoprene boots, NIOSH-approved, full-face, air-purifying respirator; and Saranex, neoprene, or Kapler CPF3 full-body suit), contain and isolate the spill, and allow the material to solidify. Scoop solid material into a steel or plastic container. For large spills, the use of self-contained breathing equipment should be considered.

Dispose of containers in accordance with all federal, state, and local guidelines and regulations. Under no circumstances should DCP be allowed to enter public sewers (sanitary or storm) or natural waters because of its toxicity to fish and aquatic organisms. See the MSDS for detailed ecological information.

CERCLA/SARA Reportable Quantities

A spill of 100 pounds or more of product is a reportable quantity (RQ) and must be reported to federal, state, and local emergency agencies. Verify with state and local agencies that this RQ is applicable at your location.

Storage

The suggested material of construction for dry DCP storage and handling systems is carbon steel. The use of copper is not recommended because DCP at elevated temperatures is corrosive to copper. If moisture is likely to be present in the DCP, carbon steel is also unsuitable. Under these circumstances, only materials with a greater nickel content, such as Hastelloy C or Monel, should be used. Stainless steel should be avoided because of the potential for stress-corrosion cracking. Contact your Dow AgroSciences representative for more information on materials of construction compatibilities.

Storage tanks should be equipped with a regulated nitrogen pad/depad system. The tank should be vented to a scrubber system to avoid emissions of DCP. However, the scrubber must be properly isolated from the storage tank to avoid contamination of DCP with scrubber solution. Tank levels should be continuously monitored and have a redundant high-level alarm. Secondary containment should be constructed from or coated with an acid-resistant material. Safety showers and eyebaths must be located nearby and routinely and frequently tested to ensure proper operation.

To clear piping and equipment for maintenance, all piping should be sloped to a low point for drainage and proper disposal in accordance with all federal, state, and local guidelines and regulations. Double-block valve and bleed systems should be used whenever possible to isolate DCP from maintenance personnel. To minimize the potential for contaminating the DCP system with water, no water lines should be hard-piped into the system.

Warning!

Molten DCP leaking through holes in piping, storage, or handling equipment will solidify when exposed to normal ambient temperatures and can plug existing holes. Steam cleaning will melt the product. Precautions (use of all recommended personal protection equipment) must be taken to avoid the potential for exposure from spraying or splashing molten or hot product during clean-up, maintenance, repairs, etc.

Commitment to Responsible Care® and Product Stewardship

This *2,4-Dichlorophenol Safe Handling Guide* has been prepared as part of Dow AgroSciences' product stewardship program and Responsible Care. Dow AgroSciences is dedicated to meeting the guiding principles of the global Responsible Care initiative. These principles emphasize continuous improvement in pollution prevention, employee health and safety, distribution, process safety, product stewardship, and community awareness and emergency response.

This guide includes considerations for handling DCP and describes equipment suitable for storage and handling of bulk quantities. The guide details Dow AgroSciences' interpretation of many codes and regulations relevant to this type of product. If government requirements applicable to your facility are more stringent, those requirements must be followed.

This guide is not intended as, and should not be used as, a substitute for engineering or legal advice. Applicable legislation and regulations are constantly changing. Future regulatory and judicial developments could necessitate changes to the procedures recommended in this guide. Each user or handler of 2,4-dichlorophenol is responsible for compliance with all applicable federal, state, and local laws, regulations, and codes.

Dow AgroSciences urges you to review your applications and procedures regularly to ensure that personnel handling DCP are thoroughly trained and properly equipped. These individuals should be aware of all potential hazards and should know how to administer first aid. For more information regarding this product, contact your Dow AgroSciences representative.

MATERIAL SAFETY DATA SHEET



Emergency Phone: 800-992-5994
Dow AgroSciences LLC
Indianapolis, IN 46268

2,4-DICHLOROPHENOL

Effective Date: 10/2/00
Product Code: 20636
MSDS Number: 000715

1. PRODUCT AND COMPANY IDENTIFICATION:

PRODUCT: 2,4-Dichlorophenol

COMPANY IDENTIFICATION:

Dow AgroSciences
9330 Zionsville Road
Indianapolis, IN 46268-1189

2. COMPOSITION/INFORMATION ON INGREDIENTS:

2,4-Dichlorophenol	CAS # 000120-83-2	97.5%
Phenolic compounds, including:		2.5%
2,6-Dichlorophenol	CAS # 000087-65-0	
2,4,6-Trichlorophenol	CAS # 000088-06-2	

This document is prepared pursuant to the OSHA Hazard Communication Standard (29 CFR 1910.1200). In addition, other substances not 'Hazardous' per this OSHA Standard may be listed. Where proprietary ingredient shows, the identity may be made available as provided in this standard.

3. HAZARDOUS IDENTIFICATIONS:

EMERGENCY OVERVIEW

Hazardous chemical. Product is a white crystalline solid at room temperature and a colorless liquid in the melted/molten state. Strong phenolic-type odor. **MOLTEN OR HOT 2,4-DICHLOROPHENOL (2,4-DCP) IS IMMEDIATELY ABSORBED THROUGH THE SKIN IN AMOUNTS THAT HAVE CAUSED DEATH TO HUMANS. RAPID DEATH IN HUMANS HAS BEEN CAUSED BY SKIN EXPOSURE WITHOUT IMMEDIATE DECONTAMINATION. AMOUNTS OF MOLTEN 2,4-DCP THAT MAY COVER AS LITTLE AS 1% BODY SURFACE AREA (PALM OF HAND-SIZED) MAY CAUSE DEATH.** May cause severe eye irritation with corneal injury, which may cause permanent impairment, even blindness. Short single exposure may cause skin burns. Contact with heated material may cause thermal burns. LD₅₀ for skin absorption in rabbits is 780 (molten) - 4000 (solid) mg/kg. Oral LD₅₀ for rats is 2000-5000 mg/kg. DOT classification is **CORROSIVE**. Flash Point is 219°F (104°C). Freeze point is 108°F (42°C). Toxic to aquatic organisms.
EMERGENCY PHONE NUMBER: 800-992-5994

POTENTIAL HEALTH EFFECTS: This section includes possible adverse effects, which could occur if this material is not handled in the recommended manner.

EYE: May cause severe irritation with corneal injury, which may result in permanent impairment of vision, even blindness. Material may be handled at elevated temperatures; contact with heated material may cause thermal burns. Elevated temperatures may generate vapor levels sufficient to cause eye irritation.

SKIN: Short single exposure may cause skin burns. Rapidly absorbed through skin in amounts that could cause death. Molten or hot 2,4-DCP is immediately absorbed through the skin in amounts that have caused death to humans. Rapid death in humans has been caused by skin exposure without immediate decontamination. Amounts of molten 2,4-DCP that may cover as little as 1% body surface area (palm of hand-sized) may cause death. 2,4-DCP is absorbed more readily through skin when in solution or molten than as a solid. The LD₅₀ for skin absorption in rabbits is 780 (molten) - 4000 (solid) mg/kg. Classified as corrosive to the skin according to DOT guidelines.

INGESTION: Single dose oral toxicity is low. The oral LD₅₀ for rats is 2000-5000 mg/kg. Small amounts that might be swallowed incidental to normal handling operations are not likely to cause injury; however, swallowing larger amounts may cause injury. Ingestion may cause burns of the mouth and throat.

INHALATION: Dusts may cause severe irritation of the upper respiratory tract (nose and throat). Elevated temperatures may generate vapor levels sufficient to cause respiratory irritation.

SYSTEMIC & OTHER EFFECTS: In animals, effects have been reported on the following organs: blood forming organs, kidney and liver.

2000 NOV 20 AM 10:45

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MATERIAL SAFETY DATA SHEET



Emergency Phone: 300-992-5994
Dow AgroSciences LLC
Indianapolis, IN 46268

2,4-DICHLOROPHENOL

Effective Date: 10/2/00
Product Code: 20636
MSDS Number: 000715

CANCER INFORMATION: 2,4-DCP did not cause cancer in laboratory animals. This mixture contains 2,4,6-trichlorophenol that is listed as a potential carcinogen for hazard communication purposes under OSHA Standard 29 CFR 1910.1200. 2,4,6-trichlorophenol may be present as an impurity at 0.1% in current samples. This material may also have been present when 2,4-DCP was tested for carcinogenicity and produced in-conclusive results.

TERATOLOGY (BIRTH DEFECTS): Birth defects are unlikely. Exposures having no adverse effects on the mother should have no effect on the fetus.

REPRODUCTIVE EFFECTS: No relevant information found.

4. FIRST AID:

NOTE: First Aid responders should pay attention to self-protection and use the recommended protective clothing (chemical resistant gloves and splash protection).

EYES: Immediate and continuous irrigation with flowing water for at least 30 minutes is imperative. Prompt medical consultation is essential.

SKIN: Immediately wash thoroughly any size exposure with non-abrasive soap and large quantities of water for 30 minutes while removing contaminated clothing and shoes. Destroy and dispose of items that cannot be decontaminated, such as shoes. It is recommended that further amounts of 2,4-DCP may be removed from the skin by repeatedly spraying/swabbing the skin with polyethylene or polypropylene glycol mixtures, alternating with rinsing with large quantities of water for 30 minutes. Example decontamination mixtures include PEG300/ethanol (or industrial methylated spirits) 2:1, or available polypropylene/rapeseed oil proprietary mixtures, or polyvinylpyrrolidone/detergent mixtures.

INGESTION: Do not induce vomiting. Give large amounts of water or milk if available and transport to a medical facility. Do not give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air if effects occur. Consult a physician.

NOTE TO PHYSICIAN: Immediately wash thoroughly any size exposure with non-abrasive soap and large quantities of water for 30 minutes while removing contaminated clothing and shoes. Destroy and dispose of items that cannot be decontaminated, such as shoes. It is recommended that further amounts of 2,4-DCP may be removed from the skin by repeatedly spraying/swabbing the skin with polyethylene or polypropylene glycol mixtures, alternating with rinsing with large quantities of water for 30 minutes. Example decontamination mixtures include PEG300/ethanol (or industrial methylated spirits) 2:1, or available polypropylene/rapeseed oil proprietary mixtures, or polyvinylpyrrolidone/detergent mixtures. The determination of urinary phenols may be useful in determining the extent of absorption. Phenol destroys the nerve endings in the skin; the absence of pain does not necessarily mean the skin has been properly decontaminated. May cause tissue destruction leading to stricture. If lavage is performed, suggest endotracheal and/or esophageal control. If burn is present, treat as any thermal burn, after decontamination. Supportive care. Treatment based on judgement of the physician in response to reactions of the patient.

5. FIRE FIGHTING MEASURES:

FLASH POINT: 219°F (104°C)
METHOD USED: TCC

FLAMMABLE LIMITS

LFL: Not determined
UFL: Not determined

AUTOIGNITION TEMPERATURE: 1207°F (653°C)

HAZARDOUS COMBUSTION PRODUCTS: During a fire, smoke may contain the original material in addition to unidentified toxic and/or irritating compounds. Hazardous combustion products may include and are not limited to hydrogen chloride, carbon monoxide, and carbon dioxide.

OTHER FLAMMABILITY INFORMATION: Violent steam generation or eruption may occur upon application of direct water stream to hot liquids. Dense smoke is produced when product burns. Do not permit dust to accumulate. Dust layers can be ignited by spontaneous combustion or other ignition sources. When suspended in air dust can pose an explosion hazard.

MATERIAL SAFETY DATA SHEET



Emergency Phone: 800-992-5994
Dow AgroSciences LLC
Indianapolis, IN 46268

2,4-DICHLOROPHENOL

Effective Date: 10/2/00
Product Code: 20635
MSDS Number: 000715

EXTINGUISHING MEDIA: Water fog or fine spray, carbon dioxide, dry chemical or foam. Alcohol resistant foams (ATC type) are preferred if available. General-purpose synthetic foams (including AFFF) or protein foams may function, but much less effectively. Water fog, applied gently may be used as a blanket for fire extinguishment. Do not use direct water stream. May spread fire.

MEDIA TO BE AVOIDED: Do not use direct water stream.

FIREFIGHTING INSTRUCTIONS: Keep people away. Isolate fire area and deny unnecessary entry. Consider feasibility of a controlled burn to minimize environmental damage. Foam fire extinguishing system is preferred as uncontrolled water can spread possible contamination. Cool surroundings with water to localize fire zone. Soak thoroughly with water to cool and prevent re-ignition. Burning liquids may be moved by flushing with water to protect personnel and minimize property damage. Water fog, applied gently may be used as a blanket for fire extinguishment. Do not use direct water stream. May spread fire. Dust explosion hazard may result from forceful application of fire extinguishing agents. Hand held carbon dioxide or dry chemical extinguishers might be used for small fires. Contain firewater run-off if possible. Firewater run-off, if not contained, may cause environmental damage. Review the "Accidental Release Measures" and "Ecological Information" sections of this MSDS.

PROTECTIVE EQUIPMENT FOR FIREFIGHTERS: Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, pants, boots, and gloves). Avoid contact with this material during fire fighting operations. If contact is likely, change to full chemical resistant clothing with SCBA. This will not provide sufficient fire protection. Consider fighting fire from a remote location. For protective equipment in post-fire or non-fire clean up situations, refer to the relevant sections.

6. ACCIDENTAL RELEASE MEASURES:

ACTION TO TAKE FOR SPILLS/LEAKS: Contain and sweep up small spills of flaked 2,4-DCP. Do not use water to wash down spill area. Wear appropriate PPE (see Section 8). For molten 2,4-DCP, wear full PPE (see Section 8), dike the area, and allow the material to solidify and follow the above procedures for flaked material. If a large spill occurs, immediately notify Dow AgroSciences at 800-992-5994.

7. HANDLING AND STORAGE:

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE:

HANDLING OF FLAKED 2,4-DCP. DANGER. Keep out of reach of children. Causes severe eye burns. Causes severe skin burns. May be fatal if absorbed through the skin. Causes severe burns of the mouth and throat. Dust and vapors are extremely irritating if inhaled. May cause liver, kidney and blood effects. Good housekeeping and controlling of dusts are necessary for safe handling of product. See Sections 3, 4, & 8 for additional information.

HANDLING OF MOLTEN 2,4-DCP. DANGER. Molten or hot 2,4-DCP is immediately absorbed through the skin in amounts that have caused death to humans. Rapid death in humans has been caused by skin exposure without immediate decontamination. Amounts of molten 2,4-DCP that may cover as little as 1% body surface area (palm of hand-sized) may cause death. Brief contact with heated material may cause thermal burns. See Section 3, 4, & 8 for additional information.

WARNING: Molten 2,4-DCP leaking through holes in piping, storage, or handling equipment will solidify when exposed to normal ambient temperatures and can plug existing holes. Steam cleaning will melt the product to the molten state. Precautions, such as the use of recommended PPE (See Section 8), must be taken to avoid the potential for exposure from spraying or splashing of molten or hot product during clean-up, maintenance, or repairs, etc.

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Indianapolis, IN 46268

2,4-DICHLOROPHENOL

Effective Date: 10/2/00
Product Code: 20636
MSDS Number: 000715

STORAGE: Stable under normal handling and storage conditions. Suggested materials of construction for solid and liquid 2,4-DCP is Carbon Steel. Copper is corroded by 2,4-DCP at elevated temperatures and is not recommended for use. Moisture in 2,4-DCP increases the potential for corrosion, therefore, rendering carbon steel inadequate as a material of construction. If 2,4-DCP contains moisture, materials such as Hastelloy C or Monel (both contain a greater nickel content) should be used. Stainless steel should be avoided due to the potential for stress-corrosion cracking.

WARNING: Molten 2,4-DCP leaking through holes in piping, storage, or handling equipment will solidify when exposed to normal ambient temperatures and can plug existing holes. Steam cleaning will melt the product to the molten state. Precautions, such as the use of recommended PPE (See Section 8), must be taken to avoid the potential for exposure from spraying or splashing of molten or hot product during clean-up, maintenance, or repairs, etc.

For additional information regarding storage and handling of 2,4-DCP, please obtain a copy of the 2,4-DCP Safe Handling Guide from:

Customer Information Center
Dow AgroSciences
9330 Zionsville Road
Indianapolis, IN 46268
Telephone: 800-992-5994, Option 4

8. EXPOSURE CONTROLS/PERSONAL PROTECTION:

These precautions are suggested for conditions where a potential for exposure exists. Emergency conditions may require additional precautions.

EXPOSURE GUIDELINE(S): 2,4-DCP: Dow AgroSciences Industrial Hygiene Guideline is 1 ppm, skin. (Immediately absorbed through the skin in amounts that have caused rapid death to humans).

A "skin" notation following the exposure guideline refers to the potential for dermal absorption of the material. It is intended to alert the reader that inhalation may not be the only route of exposure and that measures to minimize dermal exposures should be considered.

ENGINEERING CONTROLS: Provide general and/or local exhaust ventilation to control airborne levels below the exposure guidelines.

RECOMMENDATIONS FOR MANUFACTURING, COMMERCIAL BLENDING AND PACKAGING WORKERS:

RESPIRATORY PROTECTION: Use a NIOSH approved full-face air-purifying respirator. For emergency response or for situations where the atmospheric level is unknown, use a NIOSH approved positive-pressure self-contained breathing apparatus.

SKIN PROTECTION: Use protective clothing impervious to this material. Selection of specific items such as face shield, gloves, boots, apron, or full body suit will depend on operation. Use gloves, impervious to this material, at all times. Safety shower should be located in immediate work area. Remove contaminated clothing immediately, wash skin area with soap and water, and launder clothing before reuse. Items, which cannot be decontaminated, such as shoes, belts, and watchbands, should be removed, destroyed, and disposed. Use gloves with insulation for thermal protection, when needed. The following personal protective clothing is recommended: gloves: nitrile or neoprene; boots: neoprene; suit: Saranex, neoprene, or Kapler CPF3. See Section 4 for additional information.

EYE PROTECTION: Use chemical goggles. Eye wash fountain should be located in immediate work area. If vapor exposure causes eye discomfort, use a NIOSH approved full-face respirator for organic vapors.

9. PHYSICAL AND CHEMICAL PROPERTIES:

BOILING POINT: 419°F (215°C)
VAPOR PRESSURE: (mmHg @ 20°C) 0.10
VAPOR DENSITY (Air=1): 5.6
SOLUBILITY IN WATER: 0.45g/100g
SPECIFIC GRAVITY: 1.382 (60°C/4°C)
FREEZE POINT: 108°F, 42°C
APPEARANCE: White crystalline solid at room temperature
Colorless liquid (melted/molten)
ODOR: Strong phenolic-type

MATERIAL SAFETY DATA SHEET



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2,4-DICHLOROPHENOL

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10. STABILITY AND REACTIVITY:

STABILITY: Stable under recommended storage conditions. See Section 7.

CONDITIONS TO AVOID: Product can decompose at elevated temperatures.

HAZARDOUS DECOMPOSITION: Hazardous decomposition products depend upon temperature, air supply and the presence of other materials.

INCOMPATIBLE MATERIALS: Avoid contact with oxidizing materials. Moderately corrosive. Avoid contact with metals such as copper and steel.

HAZARDOUS POLYMERIZATION: Not known to occur.

11. TOXICOLOGICAL INFORMATION:

MUTAGENICITY (EFFECTS ON GENETIC MATERIAL): In-vitro mutagenicity studies were negative in some cases and positive in other cases.

12. ECOLOGICAL INFORMATION:

ENVIRONMENTAL FATE:

MOVEMENT AND PARTITIONING: Bioconcentration potential is moderate (BCF between 100 and 3000 or Log Pow between 3 and 5). Potential for mobility in soil is low (Koc between 500 and 2000). Measured log octanol/water partition coefficient (log Pow) is 3.06. Log soil organic carbon partition coefficient (Log Koc) is 2.74. Bioconcentration factor (BCF) in fish is 34.

DEGRADATION AND PERSISTENCE: Biodegradation under aerobic static laboratory conditions is high (BOD20 or BOD28/ThOD greater than 40%).

5-Day biochemical oxygen demand (BOD5) is 0.90 p/p.
10-Day biochemical oxygen demand (BOD10) is 0.92 p/p.
20-Day biochemical oxygen demand (BOD20) is 0.92 p/p.
Theoretical oxygen demand (ThOD) is calculated to be 1.18 p/p.

Inhibitory concentration (IC₅₀) in OECD Activated Sludge Respiration Inhibition Test (OECD Test No. 209) is 52.5 mg/L.

ECOTOXICOLOGY: Material is moderately toxic to aquatic organisms on an acute basis (LC₅₀/EC₅₀ between 1 and 10 mg/L in most sensitive species).

Acute LC₅₀ for fathead minnow (*Pimephales promelas*) is 6.9 mg/L.

Acute LC₅₀ for goldfish (*Carassius auratus*) is 7.8 mg/L.

Acute LC₅₀ for guppy (*Poecilia reticulata*) is 4.2 mg/L.

Acute LC₅₀ for water flea (*Daphnia magna*) is 3.9 mg/L.

Maximum acceptable toxicant concentration (MATC) in fathead minnow (*Pimephales promelas*) is 0.795 mg/L.

Maximum acceptable toxicant concentration (MATC) in water flea (*Daphnia magna*) is 0.44 mg/L.

Acute LC₅₀ for rainbow trout (*Oncorhynchus mykiss*) is 2.6 mg/L.

13. DISPOSAL CONSIDERATIONS:

DISPOSAL METHOD: Wastes are toxic. Improper disposal of excess material is a violation of Federal law and may contaminate groundwater. If these wastes cannot be disposed of by use according to label instructions, contact your state agency or environmental control agency, or the hazardous waste representative at the nearest EPA regional office for guidance.

14. TRANSPORT INFORMATION:

DOT CLASSIFICATION FOR MOLTEN OR HOT 2,4-DCP:
TOXIC LIQUID, CORROSIVE, ORGANIC, N.O.S.
(2,4-DICHLOROPHENOL)/6.1/UN 2927/PG I/RQ
(2,4-DICHLOROPHENOL)/100 LBS/MARINE
POLLUTANT/ HOT

DOT CLASSIFICATION FOR DRY OR FLAKE 2,4-DCP:
TOXIC SOLIDS, CORROSIVE, ORGANIC, N.O.S.
(2,4-DICHLOROPHENOL)/6.1/UN 2928/PG II/RQ
(2,4 DICHLOROPHENOL)/100 LBS/MARINE POLLUTANT

MATERIAL SAFETY DATA SHEET



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2,4-DICHLOROPHENOL

Effective Date: 10/2/00
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15. REGULATORY INFORMATION NOTICE:

The information herein is presented in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ from one location to another; it is the buyer's responsibility to ensure that its activities comply with federal, state or provincial, and local laws. The following specific information is made for the purpose of complying with numerous federal, state or provincial, and local laws and regulations.

STATE RIGHT-TO-KNOW: The following product components are cited on certain state lists as mentioned. Non-listed components may be shown in the composition section of the MSDS.

CHEMICAL NAME	CAS NUMBER	LIST
2,6-Dichlorophenol	000087-65-0	NJ3 PA1 PA3
2,4,6-Trichlorophenol	000088-06-2	PA2 NJ1
2,4-Dichlorophenol	000120-83-2	NJ2 NJ3 PA1

NJ1=New Jersey Special Health Hazard Substance (present at > or = to 0.1%).
 NJ2=New Jersey Environmental Hazardous Substance (present at > or = to 1.0%).
 NJ3=New Jersey Workplace Hazardous Substance (present at > or = to 1.0%).
 PA1=Pennsylvania Hazardous Substance (present at > or = to 1.0%).
 PA2=Pennsylvania Special Hazardous Substance (present at > or = to 0.01%).
 PA3=Pennsylvania Environmental Hazardous Substance (present at > or = to 1.0%).

U.S. REGULATIONS

SARA 313 INFORMATION: This product contains the following substances subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372:

CHEMICAL NAME	CAS NUMBER	CONCENTRATION
2,4,6-Trichlorophenol	000088-06-2	0.1%
2,4-Dichlorophenol	000120-83-2	97.5%

SARA HAZARD CATEGORY: This product has been reviewed according to the EPA "Hazard Categories" promulgated under Sections 311 and 312 of the Superfund Amendment and Reauthorization Act of 1986 (SARA Title III) and is considered, under applicable definitions, to meet the following categories:

- An immediate health hazard
- A delayed health hazard

CALIFORNIA PROPOSITION 65: The following statement is made in order to comply with the California Safe Drinking Water and Toxic Enforcement Act of 1986: This product contains a chemical(s) known to the State of California to cause cancer. (See Section 3 or 11 of the MSDS for details on carcinogenicity.)

TOXIC SUBSTANCES CONTROL ACT (TSCA):

All ingredients are on the TSCA inventory or are not required to be listed on the TSCA inventory. If you export this product, verify that the ingredients meet the inventory listing requirements of the receiving country or contact Dow AgroSciences.

OSHA HAZARD COMMUNICATION STANDARD:

This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) RATINGS:

CATEGORY	RATING
Health	3
Flammability	1
Reactivity	1

COMPREHENSIVE ENVIRONMENTAL RESPONSE COMPENSATION AND LIABILITY ACT (CERCLA, or SUPERFUND): This product contains the following substance(s) listed as "Hazardous Substances" under CERCLA, which may require reporting of releases:

Chemical Name	CAS Number	RQ	% in Product
2,4-Dichlorophenol	000120-83-2	100	97.5%
2,4,6-Trichlorophenol	000088-06-2	10	0.1%
2,6-Dichlorophenol	000087-65-0	100	1.0%

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MATERIAL SAFETY DATA SHEET



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2,4-DICHLOROPHENOL

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RCRA Categorization Hazardous Code:

2,4-Dichlorophenol = U081
2,4,6-Trichlorophenol = F027
2,6-Dichlorophenol = U082

16. OTHER INFORMATION:

MSDS STATUS: Revised Sections: 3, 4, 5, 6, 7, 8, 9, 10, 14
Reference: DR-0002-6288
Replaces MSDS dated: 8/1/00
Document Code: D03-135-001

The Information Herein Is Given In Good Faith, But No
Warranty, Express or Implied, Is Made. Consult Dow
AgroSciences for Further Information.

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CERTIFICATE OF AUTHENTICITY

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