HEALTH AND SAFETY PLAN

FMC MIDDLEPORT SITE
EPA ID NO. NYD002126845

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ACRONYMS

Acronym	Definition / Description
ACGIH	American Conference of Government Industrial Hygienists
Agencies	NYSDEC and USEPA (collectively)
AHA	Activity Hazard Analysis
ANSI	American National Standards Institute
AOC	Administrative Order on Consent
CAMP	Community Air Monitoring Plan
CFR	Code of Federal Regulations
COC	Contaminants of concern
CRZ	Contamination reduction zone
DOH	(New York State) Department of Health
EH&S	Environmental Health and Safety
EHSM	Environmental Health and Safety Manager
ERC	Emergency Response Coordinator
EZ	Exclusion zone
FMC	FMC Corporation
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response Standards
ICM	Interim corrective measure
JHA	Job Hazard Assessment
JSA	Job Safety Analysis
mg/m^3	Milligram(s) per cubic meter
NIOSH	National Institute for Occupational Safety and Health
NYSDEC	New York State Department of Environmental Conservation
OSC	On-Scene Coordinator
OSHA	Occupational Safety and Health Administration
PEL	Permissible exposure limit
PID	Photoionization detector
PPE	Personal protective equipment
ppm	Part(s) per million
RCRA	Resource Conservation and Recovery Act
SERP	Site Emergency Response Plan
SOP	Standard operating procedure
SSHO	Site Safety and Health Officer
TLV	Threshold limit value
TWA	Time weighted average
USEPA	United States Environmental Protection Agency
WSI	Western Surface Impoundment

1.0 INTRODUCTION

The Health and Safety Plan (HASP) presented herein describes minimum health and safety requirements to be followed during work conducted as part of RCRA corrective action activities or associated with existing Interim Corrective Measures (ICMs) at the FMC Corporation (FMC) plant site located in Middleport, New York (Facility or Site) or in off-Site areas where FMC-related contamination is suspected to be present.

Any work activities that may potentially result in contact with contaminated environmental media (soil, sediment or water) at the Site are subject to the health and safety requirements specified in this HASP as well as the OSHA HAZWOPER[1] rules and regulations. Such work may include but is not limited to the following:

- Ground invasive activities within the northern portion of the Facility (i.e., excavating into the North Site Cover).
- Repair or installation of buried utilities and power poles.
- Construction and demolition of Site buildings when such activities can potentially involve contact with contaminated environmental media.
- Operation and maintenance of the Facility groundwater extraction well systems, Western Surface Impoundment (WSI), Water Treatment Plant, the North Site Cover, surface water/groundwater collection underdrains and sumps, and ESI Fill Area Cover.
- Sampling and handling of contaminated environmental media.
- Management of contaminated environmental media.

The applicability of this HASP extends to FMC employees and its contractors. FMC contractors will be required to establish and follow their own project-specific HASPs that meet the requirements specified in this HASP, other FMC health and safety requirements, and applicable rules and regulations.

This HASP also contains requirements for community air monitoring during any ground invasive activity within the northern portion of the Facility.

1.1 Facility Description and History

The Facility formulates and packages pesticides and is located in the southeast corner of the Village of Middleport, Niagara County, New York (see Figure 1) on approximately 102 acres. The area surrounding the Facility primarily consists of a mixture of commercial and residential properties. The entire perimeter of the Facility is fenced, and access is provided via two entrances. The Facility is bounded to the north by a railroad line, to the south by commercial properties and a state highway (Route 31), to the east by agricultural land and an automobile junkyard, and to the west by residential properties. The Royalton-Hartland Junior-Senior High School is located immediately north of the railroad line.

As a result of past manufacturing operations and waste management practices at the Facility, the subsurface areas within the northern portion of the Facility's property have been contaminated. Investigation and remediation of those impacted areas is being addressed under a Resource Conservation and Recovery (RCRA) Corrective Action

[1] OSHA HAZWOPER – Occupational Safety and Health Administration Hazardous Waste Operations and Emergency Response Standards

Program with oversight from the United States Environmental Protection Agency (USEPA), New York State Department of Environmental Conservation (NYSDEC) and the New York State Department of Health (DOH).

The Facility is divided into two areas:

- The southern part of the Facility comprises approximately 39 acres and has not been significantly impacted by past operations. Storm water from this area is directed into a series of swales and buried culverts and combines with the effluent from the onsite water treatment Plant (WTP) for discharge in accordance with the Facility State Pollution Discharge Elimination System (SPDES) Permit.
- The northern part of the Facility comprises approximately 63 acres where current and historic pesticide manufacturing/formulation activities occurred. This area is primarily covered with the footprint of buildings/structures, paved roadway and parking areas, and the engineered North Site Cover (NSC). The NSC occupies approximately 47 acres of the Facility and includes different cover systems, 1) asphalt lined swales, 2) a 24-inch-thick soil cover system, or 3) polyurea liner/cover over asphalt. The ESI Fill Area occupies the northeaster portion of the Facility and has a 6-inch thick grassy soil cover.

  Surface water runoff from the northern part of the Facility is directed primarily to asphalt-lined or grass-covered swales that drain to the Western Surface Impoundment (WSI). Some surface water is also directed to collection sumps that pump to the Facility groundwater storage tanks. The approximate limits of the NSC Area are shown in the Site Plan (Figure 2).

2.0 ORGANIZATIONAL STRUCTURE

The following section describes the roles and responsibilities for key staff members and Contractors working at the Facility. The names and contact information for each of the roles listed are included in Attachment 1 (Key Project Personnel Contact List). Attachment 1 will be updated on a regular basis as individual assignments change.

2.1 Site Safety and Health Officer (SSHO)

The Facility Environmental Health and Safety (EH&S) Manager will designate a Site Safety and Health Officer (SSHO) who, will be responsible for decisions regarding operations and work stoppage due to health and safety considerations. Other responsibilities include:

- Implementing this HASP
- Conducting applicable health and safety training, including review of applicable plant health and safety requirements
- Preparing and coordinating the site work plan
- Verifying that contractors are meeting the requirements of this HASP, applicable regulatory standards, and FMC standards and guidelines
- Managing the safety and health functions on this site
- Serving as the Facility's point of contact for safety and health matters
- Ensuring site monitoring, worker training, medical surveillance, and effective selection and use of personal protective equipment (PPE)
- Assessing site conditions for unsafe acts and conditions and providing corrective action
- Maintaining effective safety and health records as described in this HASP, and
- Coordinating with the Contractor Site Supervisor(s), and others as necessary for safety and health efforts.

2.2 Contractor Site Supervisor

It will be the responsibility of each Contractor to designate a Site Supervisor for the work to be performed on the FMC Site.

The Site Supervisor is responsible for field operations and reports to the SSHO. The Site Supervisor ensures the implementation of the HASP requirements and procedures in the field. The specific responsibilities of the Site Supervisor are:

- Executing the work plan and schedule as detailed by the Work Plan
- Coordination with the SSHO on safety and health, and
- Ensuring site work compliance with the requirements of this HASP.

2.3 Site Workers

Site workers are responsible for complying with this HASP, using the proper PPE, reporting unsafe acts and conditions, and following the lines of authority established for this Facility.

2.4 Emergency Coordinator

Emergency response for this Facility is managed under the Facility Emergency Action Plan (EAP). The roles and responsibilities of the Emergency Coordinator are included in the EAP as wells as the RCRA Contingency Plan, It will be each Contractor's responsibility to ensure that their Site Supervisor is familiar with these plans.

3.0 SITE CHARACTERIZATION AND JOB HAZARD ANALYSIS

3.1 Job Hazard Analysis

Table 3-1 on the following page contains the job hazard analysis information for general site activities and the planned hazard controls. This table lists general tasks. Each contractor will be required to submit a project specific hazard assessment and control plan. Biological and chemical hazards and their known or anticipated airborne concentrations are identified specific concentrations may vary by location. The potential for exposure will vary based on the location and task, the SSHO and Contractor Site Supervisor must assess the potential for exposure and develop a Job Hazard Analysis or equivalent. The information provided here is designed to satisfy the job hazard analysis requirements of 1910.120(b)(4)(ii)(A) and the workplace hazard assessment requirements of 1910.132(d). Contractors are required to complete their own hazard assessment and include in their HASP.

Table 3-2 summarizes health hazard information for known Facility contaminants of concern (COCs).

These tables summarize the information used to select and implement the specific exposure controls identified in the remainder of the HASP. When the tables are modified, related provisions elsewhere in the HASP are also modified. Tables 3-1 and 3-2 are modified by the SSHO when:

- The Scope of Work is changed by adding, eliminating, or modifying tasks
- New methods of performing site tasks are selected, and
- Observation of the performance of site tasks results in a revised characterization of the hazards.

Table 3-1
Summary of Key Physical Hazards and Controls

Activity	Hazard	Control Measures
Driving to and on site	Vehicle accident Struck-by / Line of Fire	Only licensed drivers will operate registered vehicles. Inspect vehicle, follow posted signs and speed limits. Do not use telephone or mobile device while driving. Maintain adequate space around vehicle. Use spotter when backing or moving in tight spaces. Trucks and mobile equipment must have a back-up alarm.
Walking and General site activities	Slips, Trips and Falls Contact with site Contaminants Struck-by, contact with equipment or other hazards	USEPA Level D PPE required for all environmental related work activities (all PPE must be ANSI[2] or NIOSH[3] approved): hard hat, safety glasses with side shields, safety shoes, long sleeve shirt, high visibility vest when working near equipment or traffic, gloves appropriate for task Attend site orientation and be aware of facility alarm requirements and designated rally points. Be aware of surroundings and obey all signs and barriers. Focus on task; do not walk and talk on telephone or view documents. Only trained and authorized staff members are allowed to enter regulated areas. Check in with the site supervisor prior to entry.
Material Handling	Ergonomic strains and sprains Damage to equipment	Assess lift before starting task. Use two-person lift for over 50 pounds. Use good lifting techniques. Avoid lifting with back, get a firm grip on the load, avoid awkward postures. Use mechanical lifting equipment where feasible.
Environmental Sampling and Operations Surface and Groundwater Sampling,	Slips, Trips Falls, working in rough terrain	Be aware of surroundings and plan your route. Wear Level D PPE and focus on task while walking. Clear ice and debris as necessary. Maintain good housekeeping. Post hazard areas and respect all signs and barriers

[2] ANSI – American National Standards Institute
[3] NIOSH – National Institute for Occupational Safety and Health

Activity	Hazard	Control Measures
Inspection and Monitoring activities Landscaping and Routine Maintenance	Exposure to site contaminants of concern	Establish work zones as described in Section 3. Only allow trained and authorized staff into the contamination reduction zone (CRZ) and exclusion zone (EZ). Use good work practices and avoid contact. Monitor exposure with a photoionization detector (PID) or appropriate instrument based on your task. Review Table 2-2 and be aware of chemical hazards and symptoms of exposure. Use appropriate PPE for the task. Additional dermal and respiratory protection may be required based on the potential for exposure. Each work group must conduct a task-specific hazard assessment and determine the appropriate level of PPE.
Equipment Operation	Struck-by / Line of Fire	Heavy equipment will only be used by trained authorized operators in accordance with manufacturer's specifications. Work areas will be clearly delineated and controlled. No one will be allowed within the operating radius of the equipment. A daily pre-use inspection is required and access to a spill kit. Refer to 29 CFR[4] 1926.600 for additional requirements.

[4] CFR – Code of Federal Regulations

Activity	Hazard	Control Measures
Excavation and handling of contaminated soil	Struck-by / Line of Fire	See above.
	Collapse of Excavation	Assess the soil and install excavations in accordance with 29CFR1926.651. Have a designated Competent Person on Site. Complete daily inspections of the excavation or when conditions change.
	Exposure to contaminants of concern	Use good work practices and avoid contact. Monitor exposure with a photoionization detector (PID) or appropriate instrument based on your task. Review Table 2-2 and be aware of chemical hazards and symptoms of exposure. Use appropriate PPE for the task. Additional dermal and respiratory protection may be required based on the potential for exposure. Each work group must conduct a task-specific hazard assessment and determine the appropriate level of PPE.
Drilling/Geoprobe and Subsurface Investigation activities	Contact with overhead or underground utilities	Complete a thorough site survey and site one-call clearance. Review all available site drawings and figures. Document clearance of the proposed drilling locations and consult with site owner prior to starting work. Maintain adequate clearance from all utilities, shield or guard if required distance cannot be maintained. Do not move drill rigs or equipment with elevated derricks or rigs. Plan your route and use spotters when backing or moving in tight areas. Follow all traffic signs and posted speed limits. Inspect equipment prior to use and have spill kit available.

This table provides a general summary of key hazards and site specific requirements. Each FMC work crew or contractor is required to conduct a task specific hazard assessment and document on a Job Safety Analysis (JSA), Job Hazard Assessment (JHA), Activity Hazard Analysis (AHA), or equivalent. The hazard assessment must provide a summary of tasks, list of key hazards and required controls.

PPE: *(Indicate PPE level, consistent with PPE selection criteria in Section 7.0 of this HASP. Include respiratory protection and any task-specific PPE modifications to address task-specific combination of hazards*)

Table 3-2
Chemicals of Concern

Chemical of Concern	Location	Site Action Levels	Routes of Exposure[7]	Primary Hazards
Methylene Chloride	Groundwater, soil, WWT conveyance system	**OSHA:** PEL = 25 ppm **ACGIH:** TLV/TWA =50 ppm **NIOSH:** IDLH = 5000 ppm TLV-STEL = 125 ppm	inhalation, skin absorption, ingestion, skin and/or eye contact	Liver, nervous system and systemic toxin
Ammonia	Groundwater, soil, WWT conveyance system	**OSHA:** PEL = 50 ppm **ACGIH:** TLV/TWA =25 ppm **NIOSH:** IDLH = 300 ppm TLV-STEL = 35 ppm	inhalation, skin absorption, ingestion, skin and/or eye contact	Severe irritant, causes immediate respiratory distress
Arsenic	Groundwater, soil, WWT conveyance system	**OSHA:** PEL = 0.010 mg As/m^3 **ACGIH:** TLV/TWA =0.01 mg As/m^3 **NIOSH:** IDLH = 100 mg As/m^3 TLV-STEL = 0.002 mg As/m^3	inhalation, skin absorption, skin and/or eye contact, ingestion	Systemic toxin, cancer causing agent
Lead	Groundwater, soil, WWT conveyance system	**OSHA:** PEL = 0.030 mg/m^3	inhalation, skin absorption, skin and/or eye contact, ingestion	Nervous system and systemic toxin.
Carbofuran	Bulk material used on site and concentrations in the groundwater and soil	**ACGIH:** TLV/TWA =0.1 mg/m^3	inhalation, ingestion, skin and/or eye contact	Cholinesterase inhibitor, nervous system effects, systemic toxin
Ethylene Thiourea	Groundwater, soil, WWT conveyance system	NA – as low as reasonably feasible	inhalation, ingestion, skin and/or eye contact	Toxic and irritant
7-hydroxybenzofuran	Groundwater, soil, WWT conveyance system	NA – as low as reasonably feasible	inhalation, skin absorption, ingestion, skin and/or eye contact	Toxic and irritant
BHC	Groundwater, soil, WWT conveyance system	NA – as low as reasonably feasible	inhalation, skin absorption, ingestion, skin and/or eye contact	Toxic and irritant

Chemical of Concern	Location	Site Action Levels	Routes of Exposure(7)	Primary Hazards
DDT/DDD/DDE Pesticide Compounds	Groundwater, soil, WWT conveyance system	NA – as low as reasonably feasible	inhalation, skin absorption, ingestion, skin and/or eye contact	Toxic and irritant Marine toxin
Karbutilate	Groundwater, soil, WWT conveyance system	NA – as low as reasonably feasible	inhalation, skin absorption, ingestion, skin and/or eye contact	Toxic and irritant

Notes:

Occupational Safety and Health Administration (OSHA) permissible exposure limits (PELs) as published in the NIOSH Pocket Guide

TWA = time weighted average

mg/m^3 = milligrams of contaminant per cubic meter of air

ppm = parts of contaminant per million parts of air

ACGIH TLV = American Conference of Government Industrial Hygienists Threshold Limit Value

Source: NIOSH Pocket Guide to Chemical Hazards

Routes of exposure and action levels will allow for determination of PPE required above Level D PPE. Level D PPE is minimum PPE that is required for work on this site. If any action level is exceeded further evaluation will be required to determine engineering controls or PPE required.

- New chemical, biological, or physical hazards are identified
- Exposure data indicate changes in the concentration and/or likelihood of exposure, and
- New/different control measures are selected.

3.2 Employee Notification of Hazards and Overall Site Information Program

The information in Tables 3.2 is made available to all employees who could be affected by it prior to the time they begin their work activities. Modifications to these tables are communicated during routine briefings.

Consistent with paragraph (i) of HAZWOPER, contractors and subcontractors are informed about the nature and level of hazardous substances at this site, and likely degree of exposure to workers who participate in site operations. The SSHO or Site Supervisor is responsible for providing site characterization information, this HASP, and modifications to it to other contractors and subcontractors working on this site. Employees and contractors working on this project must receive a HASP orientation and sign-off the acknowledgement page.

All contractors must attend the site-specific orientation, review the FMC contractor handbook and comply with all site specific rules and guidelines. FMC reserves the right to refuse entry or dismiss anyone that does not comply with site rules.

4.0 SITE CONTROL

This site control program is designed to reduce the spread of hazardous substances from contaminated areas to clean areas, to identify and isolate contaminated areas of the site, to facilitate emergency evacuation and medical care, to prevent unauthorized entry to the site, and to deter vandalism and theft.

The site control program includes the elements specified in 29 CFR 1910.120(d) and provides the following site-specific information:

- A site map, indicating site perimeter and work zones
- Site access procedures
- Site security
- Site work zones including standard operating procedures
- Use of the buddy system, and
- Both internal (on-site) and external communications.

The SSHO or their designee is responsible for evaluating site conditions and for verifying that the site control program functions effectively. The site control program is updated regularly to reflect current site conditions, work operations, and procedures.

A map of the Facility, showing its boundaries, designated work zones, and points of entry and exit is provided in Figure 3.

4.1 Plant Site Access

Access to the Facility is restricted to reduce the potential for exposure to safety and health hazards. During hours of site operation, site entry and exit is authorized only at the point(s) identified in Figure 3.

Visitors must check in at the security office and register with an FMC representative. Visitors are required to comply with the requirements of this HASP. Visitors who want to enter contaminated areas of the site must provide documentation that they have the required training and medical evaluation and must receive a site-specific briefing about protecting themselves from site hazards, recognizing site zones demarcations, and following emergency evacuation procedures prior to entry. Visitors are expected to provide their own PPE.

4.2 Plant Site Security

Security at this site is maintained during both working hours and non-working hours to prevent unauthorized entry; removal of contaminated material from the exclusion zone; exposure of unauthorized, unprotected people to site hazards; and increased hazards due to vandalism and theft.

FMC security is responsible for establishing and maintaining overall site security during working hours.

Each work crew or contractor is responsible for following measures for security and access during working hours:

- Security is maintained in the Support Zone and at Access Control Points to ensure only authorized entrants access the site.

- A barricade or other physical barrier is erected around the perimeter of the site to prevent unauthorized entry or exit.
- Signs have been posted around the perimeter of the site to warn of the site dangers and prohibition of unauthorized entry.
- Site personnel patrol the Facility perimeter.

4.3 Work Zones

HAZWOPER covered work zones will be categorized into three major zones, and controlled by the responsible work crew. These zones are characterized by presence or absence of biological and chemical hazards and the activities performed within them.

Zone boundaries must be clearly marked at all times and the flow of personnel and equipment among the zones is controlled.

The site is monitored for changing conditions that may warrant adjustment of zone boundaries. Zone boundaries are adjusted as necessary to protect personnel and clean areas. Whenever boundaries are adjusted, zone markings are also changed and workers are immediately notified of the change.

The following criteria were considered in establishing the site work zones:

- Required clean-up activities
- Sampling results for air and surface contaminants
- Inside traffic patterns
- Ventilation system and air circulation patterns
- Air dispersion calculations
- Potential for fire, and
- Physical, biological, other characteristics of anthrax spores and decontamination substances.

Exclusion Zone

The EZ is the area where hazardous substances are known or suspected to be present and pose the greatest potential for exposure. Remediation operations (site clean-up) are performed in the EZ.

Personnel and equipment will enter and exit the EZ from a designated access points in the CRZ.

Personnel in the EZ will adhere to the standard operating procedures (SOPs) described below.

Exclusion Zone SOPs

- Check in and out of the EZ at the designated access point.
- Use the buddy system at all times.
- Wear the PPE required for this zone (see PPE section of this HASP).
- Perform air and surface sampling as required for this zone (see Exposure Monitoring section of this HASP).

- Do not smoke, eat, or drink.
- Monitor self and buddy for signs of heat stress and other difficulties.
- Alert supervisor to signs of unanticipated hazards.
- Do not engage in horseplay.
- Monitor self and buddy for PPE improper fittings, rips, tears, and/or damage.
- Use monitoring equipment and tools that are safe for the working environment.

Contamination Reduction Zone (CRZ)

The CRZ is located between the EZ and the Support Zone (clean zone). Its primary purpose is for decontamination of workers and equipment. The CRZ also serves as a buffer between the EZ and Support Zone, to limit the potential for contamination to spread to the Support Zone and outlying areas. Work crews are responsible for establishing the CRZ boundaries. They must be marked with caution tape, barriers, construction fencing or other suitable means based on the scope and duration of the work.

Based on monitoring results, the CRZ boundaries may be adjusted to ensure that the Support Zone remains uncontaminated.

Workers and equipment exit the EZ through the designated access point(s) into the CRZ. Workers and equipment are then decontaminated in the CRZ, according to the procedures specified in the Decontamination section of this HASP. Workers and equipment then exit the CRZ into the Support Zone through the designated access points.

If necessary, emergency decontamination procedures are implemented. Emergency decontamination procedures are described in Section 11 of this HASP.

Personnel in the CRZ will adhere to the SOPs described below.

Contamination Reduction Zone SOPs

- Check in and out of this zone at the designated access point.
- Wear the PPE required for this zone (see PPE section of this HASP).
- Perform air and surface sampling as required for this zone (see Exposure Monitoring section of this HASP).
- Do not smoke, eat, or drink.
- Monitor self and buddy for signs of heat stress and other difficulties.
- Alert supervisor to signs of unanticipated hazards.
- Do not engage in horseplay.
- Monitor self and buddy for PPE improper fittings, rips, tears, and/or damage.

Support Zone

The Support Zone is the clean area of the site, beyond the outer boundary of the CRZ. There should be no contamination in this zone. Administrative, clerical, and other support functions are based in the Support Zone.

The Support Zone and its boundaries must be maintained and marked by each work crew.

Air and surface monitoring are conducted in the Support Zone as needed to ensure that it remains uncontaminated. If contamination is detected, zone boundaries are adjusted until corrective action is taken and monitoring results indicate that this zone is again uncontaminated.

Within the Support Zone, personnel adhere to the SOPs listed below.

Support Zone (SZ) SOPs

- Check in and out of this zone from the CRZ at the designated site access point.
- Alert supervisor to signs of unanticipated hazards.
- Do not engage in horseplay.
- Perform air and surface sampling as required for this zone (see Exposure Monitoring section of this HASP).

4.4 Buddy System

While working in the EZ, site workers use the buddy system. The buddy system means that personnel work in pairs and stay in close visual contact to be able to observe one another and summon rapid assistance in case of an emergency. The responsibilities of workers using the buddy system include:

- Remaining in close visual contact with partner
- Providing partner with assistance as needed or requested
- Observing partner for signs of heat stress or other difficulties
- Periodically checking the integrity of partner's PPE, and
- Notifying the supervisor or other site personnel if emergency assistance is needed.

4.5 Site Communications

The following communication equipment is used to support on-site communications:

Telephones at this site are located in the following areas:
Security/Reception Area, Break room and designated evacuation assembly areas

A current list of emergency contact numbers is posted in the following locations:
See Section 1 of this HASP. Contractors must prepare their own HASPs, including emergency contacts.

Other forms of communication on this site include:
Voice and cell phone communication; radios may be used as necessary.

Each contractor is required to check in with FMC representative and maintain communication via cell phone or radio if issued one. All site personnel must adhere to and obey facility alarms and directions from the SSHO.

5.0 TRAINING PROGRAM

The site training program is designed and established to ensure that workers receive or have already received the training they need to work safely and meet regulatory requirements. Site safety and health training requirements are based on the JHA contained in Section 3 of this HASP and relevant OSHA requirements.

For this site, the SSHO oversees the implementation of this training program and is responsible for ensuring that employees and contractors are adequately and currently trained for all tasks they are asked to perform. Each contractor is required to maintain documentation of training and have readily available for inspection or auditing purposes. Employees who have not been trained to a level required by their job function and responsibility are not permitted to participate in or supervise field activities.

This training program is consistent with the requirements of 29 CFR 1910.120(e) and (q)(11) and addresses the following site-specific information:

- Initial training for site workers and supervisors
- Exceptions to initial training requirements
- Site briefings for visitors and workers
- Refresher training
- Qualification of trainers
- Training certification, and
- Emergency response training.

5.1 Initial Training for Site Workers and Supervisors

Initial training requirements are based on the designation of the site as either post-emergency response operations or as a government identified uncontrolled hazardous waste site, a worker's potential for exposure, and compliance with the applicable regulatory requirements of 29 CFR 1910.120 (q)(11) and/or (e)(3).

Personnel at this site working within the CRZ or ExZ have successfully completed 40-hour initial HAZWOPER training consistent with the requirements of 29 CFR 1910.120(e)(3)(i), or have received equivalent training consistent with the provisions of 29 CFR 1910.120(e)(9), in order to work in contaminated areas. In addition, such personnel have received 3 days of supervised field experience applicable to this site.

The initial training provided to these workers addresses:

- Names of personnel and alternates responsible for site safety and health
- Safety, health and other hazards present on the site
- Use of PPE
- Work practices by which the employee can minimize risks from hazards
- Safe use of engineering controls and equipment on the site
- The site control plan detailed in Section 4.0 of this HASP
- Medical surveillance requirements detailed in Section 6.0 of this HASP
- The spill containment program detailed in Section 10.0 of this HASP

- Decontamination procedures detailed in Section 11.0 of this HASP, and
- The emergency response plan detailed in Section 12.0 of this HASP.

Additional training provided for site workers is listed in Table 5-1.

Table 5-1
Other Training for Site Workers

FMC Middleport Site Orientation
Daily pre-job "toolbox" safety meeting is required by each work crew
Review of this HASP with signature on Acknowledgement Form (see Appendix A for form)

Management and Supervisor Training

On-site managers and supervisors who are directly responsible for or who supervise workers engaged in hazardous waste operations receive, in addition to the appropriate level of worker HAZWOPER training described above, eight additional hours of specialized supervisory training, in compliance with 29 CFR 1910.120(e)(4).

5.2 Site-Specific Briefings for Visitors and Workers

A site-specific briefing is provided to all individuals, including site visitors, who enter the site beyond the initial point of access at the main security gate. Site orientation training is typically provided at the security office/reception area.

For visitors, the site-specific briefing provides information about site hazards, the site lay-out including work zones and places of refuge, the emergency alarm system and emergency evacuation procedures, and other pertinent safety and health requirements as appropriate.

5.3 Refresher Training

All workers on this site, including managers and supervisors who will be potentially exposed to potentially contaminated areas in the North Site Cover Area, receive annual HAZWOPER refresher training consistent with the requirements of 29 CFR 1910.120 Table 5-2 details the refresher training:

Table 5-2
Refresher Training Topics

Annual 8-Hour HAZWOPER refresher, as per 1910.120 requirements

5.4 Qualification of Trainers

Only instructors qualified in accordance with 29 CFR 1910.120 are used to train workers for this site. Qualified instructors have either completed a training program for the subjects they are expected to teach, or have the academic credentials and instructional experience necessary for teaching these subjects.

5.5 Training Certification

This site maintains written certification of the successful completion of applicable training requirements for all personnel. Training records are maintained up-to-date and are retained onsite with the SSHO for FMC employees. Contractors are required to maintain documentation of training and qualifications for their employees and subcontractors. Employees and supervisors receive a written certificate when they complete necessary training and field experience. Any person who has not been so certified or who does not meet the requirements of equivalent training is prohibited from engaging in the clean-up operations on this site. A signed HASP acknowledgement form must be completed prior to starting work (Appendix A).

5.6 Emergency Response Training

Emergency response training is addressed in Section 12 of this HASP, Emergency Response Plan.

6.0 MEDICAL SURVEILLANCE

The medical surveillance section of the HASP describes how worker health status is monitored for work done at the site under this plan. Medical surveillance is used when there is the potential for worker exposure to harmful levels of hazardous substances. The purpose of a medical surveillance program is to medically monitor worker health to ensure that personnel are not adversely affected by site hazards. The provisions for medical surveillance at this site are based on the site characterization and job hazard analysis found in Section 3 of this HASP. They are consistent with OSHA requirements in 29 CFR 1910.120(f) and substance-specific requirements in 29 and 26 CFR, as applicable:

- Contractors working at the facility are required to assess their work scope for applicability of medical monitoring requirements; if applicable employees will be enrolled and compliant with applicable requirements.

The medical surveillance program addresses the following information:

- Provisions of the site medical surveillance program
- Provisions of the medical protocol that addresses exposure to anthrax spores
- Communication between the site, physicians, and workers, and
- Medical recordkeeping procedures.

The person with responsibility for ensuring this program is implemented and maintained is the SSHO.

6.1 Site Medical Surveillance Requirements

Medical surveillance requirements are based on a worker's potential for exposure as determined by the site characterization and JHA documented in Section 3 of this HASP and as required by 29 CFR 1910.120(f)(2) and the substance-specific standards.

Based on limited worker exposure to hazardous substances at or above the PELs or other published exposure limits (less than 30 days per year); limited use of respirators (less than 30 days per year); and the absence of an employee-staffed hazardous materials (HAZMAT) team, the medical surveillance program required at this Facility is also limited. The Facility medical surveillance program provides that:

1. Workers assigned to tasks requiring the use of respirators receive medical examinations in accordance with 29 CFR 1910.134(e) to ensure they are physically capable to perform the work and use the equipment,
2. Workers who could potentially be exposed to covered substances are covered by a medical protocol addressing this exposure, and
3. If a worker is injured, becomes ill, or develops signs or symptoms of possible over-exposure to hazardous substances or health hazards, medical examinations are provided to that worker as soon as possible after the occurrence and as required by the attending physician.

Medical examinations and procedures are performed by or under the supervision of a licensed physician and are provided to employees free of cost, without loss of pay, and at a reasonable time and place. The need to implement a more comprehensive medical surveillance program will be re-evaluated in the event of an over-exposure incident.

6.2 Site Medical Surveillance Program

A medical surveillance program is implemented for corrective action work at this site based on the potential for employee exposure to levels of hazardous substances or health hazards in excess of the PEL or other published exposure limits, the use of respiratory protection, and/or the assignment of workers to a HAZMAT team.

Medical surveillance requirements are based on a worker's potential for exposure as determined by the site characterization and job hazard analysis documented in Section 3 of this HASP and as required by 29 CFR 1910.120(f)(2) and any substance-specific standards that apply to an employee's scope of work. Based on that evaluation:

1. Some personnel who enter contaminated areas of this site do not need to be included in the medical surveillance program. Table 6-1 below lists the types of workers who are not covered by the medical surveillance program.

Table 6-1
Types of Workers Excluded from the Medical Surveillance Program

Workers who are NOT exposed above the PEL for 30 or more days per year
Workers who do NOT wear respiratory protection
Workers that are NOT part of a HAZMAT team
Workers that have NOT experienced any signs or symptoms, or illness associated with chemical exposure

2. Personnel within the medical surveillance program receive medical examinations on the following schedule:

   - **Prior to assignment**: personnel covered by the medical surveillance program are medically examined prior to commencing work in contaminated areas of the site. The purpose of this examination is to assess baseline health status and the worker's ability to perform anticipated duties wearing required PPE without any adverse health effects. The pre-assignment medical examination must have been performed within the past 12 months. The content of the exam must include, at a minimum, the items listed in Table 6-1b below, based on the hazards present at this site and anticipated work duties. A copy of the results of that examination, in the form of a physician's written opinion as described in paragraph 6.2, must be presented on site prior to entry into contaminated areas.
   - **On an annual basis**: personnel within the medical surveillance program receive medical exams at least every 12 months to provide for ongoing assessment of a worker's health status At termination or reassignment: personnel are offered the opportunity for a medical examination upon their termination of employment or reassignment to work where the worker is not exposed to hazardous materials or required to wear a respirator
   - **Post-injury/illness**: any worker who is injured, becomes ill, or develops signs or symptoms of possible over-exposure to hazardous substances or health hazards, receives a medical examination as soon as possible after

the occurrence, with follow-up examinations provided as required by the attending physician.

All medical examinations and procedures are performed by or under the supervision of a licensed physician and are provided to workers free of cost, without loss of pay, and within a reasonable time frame.

7.0 PERSONAL PROTECTIVE EQUIPMENT

The Facility PPE program for HAZWOPER-covered activities is described below. This Section of the HASP describes how PPE is selected and used to protect workers from exposure to hazardous substances and hazardous conditions on this site (see Appendix B for material safety data sheets for known substances at the Facility). Exposure hazards from site contaminants of concern, as well as those from the decontamination process, are considered. The following topics are addressed in this Section:

- PPE selection criteria
- Site-specific PPE ensembles
- Work mission duration
- Training in use of PPE
- Respiratory protection
- Hearing conservation
- PPE maintenance and storage, and
- Evaluation of this program.

The person with overall responsibility for implementing the PPE program at the Facility is the SSHO or contractor-designated SSHO.

7.1 PPE Selection Criteria

Site safety and health hazards are eliminated or reduced to the greatest extent possible through engineering controls and work practices. Where hazards are still present, a combination of engineering controls, work practices, and PPE are used to protect employees.

An initial level of PPE is assigned to each task to provide an adequate barrier to exposure hazards. Initial PPE ensembles are selected based on the anticipated route(s) of entry of biological and chemical hazards and their concentration. Ensemble materials are selected using permeation data supplied by individual manufacturers. Materials providing the greatest duration of protection have been chosen. Tear and seam strength of the PPE are also considered to ensure ensemble durability while work is performed. When necessary, multiple layers of protection are used to accommodate the range of hazards that may be encountered. Where possible, employees are provided with a range of component sizes to ensure properly fitted PPE.

The following general criteria are used in selecting PPE levels at this site. Contractors will be required to make their own PPE determination that meet or exceed the requirements listed below and are in accordance with 29CFR1910.134.

Use of Level A Protection

Employees use Level A protection during tasks that have or potentially have the following characteristics:

- Measured or potentially high concentration(s) of atmospheric vapors, gases, or particulate.

- High potential for splash, immersion, or exposure to unexpected vapors, gases, or particulates of materials that are harmful to skin or capable of being absorbed through the skin.
- Operations in confined or poorly ventilated areas where the absence of conditions requiring Level A have not yet been determined.

Level A work is not anticipated for this Facility.

Use of Level B Protection

Employees use Level B protection during tasks that have or potentially have the following characteristics:

- Exposures are known and the highest degree of respiratory protection is needed.
- The atmosphere is oxygen deficient (<19.5%).
- There are no warning properties for the identified gases, vapors, or particulates.
- The atmosphere contains incompletely identified vapors or gases (indicated by a direct-reading instrument) not suspected of containing high levels of hazardous substances harmful to skin or capable of being absorbed through the skin.
- Atmospheres with IDLH concentrations of specific substances that present severe inhalation hazards but do not represent a skin absorption hazard.

Use of Level C Protection

Employees use Level C protection during tasks that have or potentially have an increased potential for dermal and/or respiratory exposure.

In accordance with 29 CFR 1910.134(d)(3)(iii)(B)(2), a cartridge/canister change schedule has been determined. Cartridges and canisters used with air-purifying respirators on this site are replaced when any of the following occurs:

- A NIOSH-approved end of service life indicator (ESLI) is activated
- The service time identified in the contractor specific HASP has passed (service time is total period of time canisters/cartridges are exposed to the environment), and
- Inhalation is restricted.

If warning properties (chemical odors, tastes or physical irritation) are noted, employees will immediately leave the work area and notify their site supervisor or the site safety and health officer.

Use of Level D Protection

Note that Level D Protection is the minimum required PPE for HAZWOPER-covered facilities. PPE must be provided by the contractor, agency or supporting organization, inspected before use and in good condition.

Employees will use Level D protection during HAZWOPER-covered tasks. Level D PPE consists of:

- ANSI approved Hard Hat
- ANSI approved Safety Glasses with side shields

- ANSI approved Safety Shoes/Boots
- Gloves appropriate for the task
- Class 2 or 3 High Visibility Clothes or Vest when in proximity to heavy equipment, traffic or multiple work crews, and
- Modified Level D; chemical resistant coveralls may be required for various tasks based on potential for skin contact and toxicity of the material.

7.2 Use of PPE

Site-specific PPE ensembles and materials are identified above. These ensembles are consistent with Appendix B of 29 CFR 1910.120. All PPE is used in accordance with manufacturers' recommendations, and in conjunction with Section 11.

Criteria for PPE Upgrades and Downgrades

Since PPE is primarily used as a barrier to biological and chemical exposure, airborne concentrations of site contaminants and decontamination chemicals are monitored routinely, in accordance with Section 8, Exposure Monitoring. The level of PPE is assessed based on the criteria in Table 7-1 on the following page.

The SSHO or contractor SSHO has the authority to upgrade or downgrade PPE in a timely manner to respond to changing site conditions and to protect worker health and safety. Routine evaluation of the PPE program is conducted as identified in Section 7.7 below.

All employees and contractors working on this project are to use the PPE as specified in this section or their employer specific HASP. Failure to comply with PPE requirements will result in disciplinary action up to and including removal from the site.

Work Mission Duration

Each work team identifies and monitors task-specific work duration based on the following factors:

- Physiological requirements of the task
- PPE level for the task
- Ambient temperature and humidity
- Respiratory protection capacity (air supply or cartridge change requirements)
- Chemical protective clothing capacity (permeation rate of on-site materials), and
- Acclimatization of the work force to site and task conditions.

Table 7-1
Airborne Contaminant Action Levels

Parameter	Reading	Action
Air Sampling (8-hour samples) (laboratory analysis) Lead Arsenic	<0.030 mg/m^3 <0.010 mg/m^3	Normal operations. If any of the air sampling action levels are exceeded, investigate source and increase dust suppression. If levels cannot be reduced utilize respiratory protection with appropriate protection factor.
Air Monitoring (Real-time)		
Total Particulate VOCs	0-0.150 mg/m^3	Normal operations (refer to CAMP requirements).
	<1 ppm	
	> 0.150 mg/m^3	Investigate source of particulate or VOCs, reduce generation rate. Review chemical specific hazards and use respiratory protection with appropriate protection factor.
	>1 ppm	Stop work, contact SSHO and PM. Review chemical specific hazards and use respiratory protection with appropriate protection factor.
Visual Observation	Sustained visible dust generation above normal background	Increase dust suppression measures.

Table Notes:

1) Readings for particulate are for 15 consecutive minutes, at breathing zone height, measured with a calibrated pDR or equivalent. Real-time particulate sampling instruments provide total dust levels. Action levels are in excess of background levels, as measured prior to activities onsite or offsite.
2) Readings for VOCs sustained for greater than 30 seconds, at worker breathing zone height, measured with a calibrated photo ionization detector miniRAE or equivalent. Real-time VOC sampling instruments provide total organics levels; compound-specific monitoring may be required if action levels are exceeded. Action levels exceed background levels, as measured prior to activities onsite or offsite. VOCs will only be monitored if soil excavation results in excavation of soils where VOCs are suspect.
3) All readings must be recorded and be available for Site personnel to review

7.3 Training

Employees receive general training regarding proper selection, use and inspection of PPE during initial HAZWOPER training (or equivalent) and subsequent refresher training. Site-specific PPE requirements, including task specific PPE, ensemble components, cartridge/canister service times, and inspection procedures are communicated as identified in Section 5, Training.

7.4 Respiratory Protection

Respiratory protection is selected, fitted, used, stored and maintained in accordance with the FMC Respiratory Protection Program located with the SSHO. Contractors that use respiratory protection must have their own Respiratory Protection Plan that meets the requirements of 29CFR1901.134.

7.5 Hearing Conservation

Consistent with 1910.95, hearing protection is made available when noise exposures equal or exceed an 8-hour time-weighted average sound level of 85 dBA. Hearing protection is required when the 8-hour time weighted average sound level $\geq$ 90 dBA. Where noise exposure meets or exceeds this level, noise is listed as a physical hazard in the job hazard analysis for the tasks/operation, and hearing protection is included as one of the control measures (PPE).

Hearing protection is also required for any employees who have not yet had a baseline audiogram or who have experienced a standard threshold shift and are exposed to an 8-hour time weighted average sound level $\geq$ 85 dBA.

Employees exposed to an 8-hr TWA sound level $\geq$ 90 dBA participate in a Hearing Conservation Program. A copy of the written Hearing Conservation Program is located with the SSHO.

7.6 PPE Maintenance and Storage

In order to ensure that PPE continues to provide the anticipated protection, this site uses specific procedures for PPE inspection, cleaning, maintenance, and storage. Adherence to these procedures is tracked with written inspection records

The SSHO or contractor designee is responsible for overseeing PPE maintenance and storage procedures and maintaining compliance with manufacturer's guidelines and their employer specific plans.

7.7 Evaluation of PPE Program

Assessment of PPE performance occurs throughout site activities in response to air monitoring data collected (Section 8, Exposure Monitoring) and the action levels identified in Table 7-1. Surface samples may be collected from the inside surfaces of used PPE to ensure that the equipment provides an adequate barrier throughout the work shift.

Modifications to initially selected PPE are determined by SSHO. Affected employees are informed immediately. Section 3 of the HASP, Job Hazard Analysis, is with updated information about job hazards and selected controls.

8.0 EXPOSURE MONITORING PROGRAM

This Section of the HASP describes minimum requirements and general information on action levels of key hazardous substances and worker exposures to them and how they are monitored at this site. This exposure monitoring program provides project-specific information about:

- Monitoring procedures to detect the presence of hazardous substances
- Monitoring procedures to determine worker exposures to hazardous substances and physical hazards
- Action levels and required responses for known and expected hazardous substances and physical hazards, and
- Calibration and maintenance procedures for monitoring equipment.

The SSHO or contractor designee is responsible for implementing this exposure monitoring program.

All staff conducting air monitoring will have the training, experience and skills to calibrate, operate the instruments and interpret the results to make informed decisions on the potential for exposure.

8.1 Air Monitoring

Initial Monitoring

When the job hazard analyses (JHAs) are prepared by each contractor, the task specific requirements for monitoring will be noted. Initial and periodic monitoring is conducted to quantify employee exposure during activities and the JHAs and PPE requirements are updated accordingly.

Periodic Monitoring

Periodic monitoring is conducted to evaluate potential worker exposure to airborne hazardous substances and surface contamination. Resulting data are then used to determine baseline and on-going airborne and surface concentrations of contaminants, particularly when employee exposures may change significantly or rapidly. Situations in which conditions and employee exposures may change significantly or rapidly include:

- Commencement of work on another portion of the facility
- Exposure to or handling of contaminants/hazards not previously identified
- Commencement of a new task/operation
- Change in indoor environmental conditions, and
- Commencement of task/operation that is likely to increase airborne concentrations of hazardous substances.

Periodic air monitoring is conducted using direct reading instruments, and by collecting and analyzing personal samples. Periodic monitoring associated with spill response and confined space entry is identified in Section 12, Emergency Response..

Direct reading instruments generally provide less precise data regarding the presence and concentrations of materials with a specific chemical characteristic. Consequently, the general site action limits will be applied (Table 8-1) and can be used by qualified

employees to make quick decisions regarding the adequacy of the PPE worn and other implemented controls.

Table 8-1 summarizes the direct-reading monitoring equipment and monitoring frequency along with suggested sampling for typical tasks. Table 8-1 also identifies the applicable action limit to allow appropriate actions when airborne concentrations exceed these values. Qualified employees, identified in section 8.0, conduct direct-reading monitoring and interpret data according to the information listed in Table 8-1.

Contractors are required to develop and implement their own task specific air monitoring and exposure assessment criteria that are at least as stringent as this plan and meets applicable OSHA requirements.

Table 8-1
Airborne Contaminant Action Levels

Parameter	Reading	Action
Air Sampling (laboratory analysis) Lead Arsenic (conducted as needed based on work scope)	<0.030 mg/m^3 <0.010 mg/m^3	Normal operations. If any of the air sampling action levels are exceeded, investigate source and increase dust suppression. If levels cannot be reduced utilize respiratory protection with appropriate protection factor.
Air Monitoring (Real-time)		
Total Particulate VOCs	0-0.2 mg/m^3 <1 ppm	Normal operations (refer to CAMP requirements).
	> 0.2 mg/m^3	Investigate source of particulate or VOCs, reduce generation rate, Review chemical specific hazard,s and utilize respiratory protection with appropriate protection factor.
	>1 ppm	Stop work, contact SSHO and PM. Review chemical specific hazards and utilize respiratory protection with appropriate protection factor.
Additional Analytes		
Metals Acid / irritant gas Specific organic compounds	>50% of the PEL/TLV	Investigate source, reduce generation rate. Upgrade PPE if levels cannot be reduced below 50% of the PEL/TLV.
Visual Observation	Sustained visible dust generation above normal	Increase dust suppression measures.

Action limits identified are based on occupational exposure guidelines and industry practice.

Air sample collection and analysis are used to determine the identity and quantity of materials to which workers are exposed throughout the work shift. Consistent with HAZWOPER, personal air samples are collected in the breathing zones of employees expected to have the highest exposure during the task or in the facility location being evaluated. If exposures for these employees exceed the exposure limits identified in Table 8-1, additional samples are collected in the breathing zones of all employees associated with the task or the facility location evaluated. Full-shift and short-term samples are collected, providing quantitative results that can be compared to OSHA Permissible Exposure Limits and other published exposure limits. Frequency and duration of sample collection are also consistent with the requirements in OSHA's substance-specific standards,

Laboratory-analyzed sample results are used to evaluate the accuracy of direct-reading monitoring data as well as to quantify worker exposures and to determine the effectiveness of the exposure controls used at this facility. Laboratory results are compared with the direct-reading data to ensure that direct-reading instruments can be used to predict instances when exposures exceed defined exposure limits and the margin by which these values were exceeded. If a direct-reading instrument is not compatible with the contaminants identified in the air sample results, or the direct-reading data appear to be inadequate, the SSHO or contractor designee is responsible for determining an alternative monitoring strategy. If the monitoring strategy must be modified, the HASP will be revised accordingly and affected employees will be briefed about this change on the following day.

Community Air Monitoring

Each contractor or agency working on site must prepare and implement a Community Air Monitoring Plan that is consistent with the Community Air Monitoring Plan included in this HASP as Appendix C.

Equipment Calibration and Maintenance

All real-time monitoring instruments and sampling equipment must be calibrated and maintained according to the manufacturers' recommendations. Copies of the manufacturers' recommendations and instrument calibration and maintenance records will be maintained by the SSHO or contractor designee.

Sample Management

Procedures for collecting, handling, and shipping laboratory samples will be in accordance with the selected method and laboratory guidance.

9.0 HEAT AND COLD STRESS PREVENTION PROGRAM

This Section of the HASP describes how the site-specific environmental conditions (temperature, humidity, air movement), employee work loads, and PPE may expose employees to hazards resulting in injury or illness related to heat and cold stress. This Heat Stress Prevention Program outlines exposure controls to protect employees working in hot environments. The elements of this program are outlined in this section and include the following:

- Program Implementation Criteria
- Heat Stress Management, and
- Training.

The SSHO is responsible for implementing the Heat and Cold Stress Prevention Program, monitoring work area heat conditions and worker physiological parameters, and for ensuring that employees are trained to recognize the signs and symptoms of heat stress illnesses or injury and what to do if these occur.

9.1 Program Implementation Criteria

The Heat Stress Prevention Program is implemented when work area temperatures rise above 72^{o}F. The Cold Stress Program will be implemented when temperatures are below 40^{o}F or wind and weather conditions dictate.

9.2 Heat Stress Management

Work practices and exposure controls are used to reduce the risk of elevating an employee's core body temperature, cooling temperature or cold extremities. These work practices and exposure controls include the following:

- Defining and adjusting employee work/rest intervals
- Monitoring for physiological signs of heat and cold stress
- Providing access to liquids and electrolytes
- Establishing and implementing acclimatization schedules
- Using warm weather cooling garments and heated break areas, and
- Using adequate clothing and PPE.

Employee Work/Rest Intervals

Work/rest intervals are based on PPE, employee work loads, environmental conditions (temperature, humidity, air movement), and the results of physiological monitoring. Work/rest intervals are determined by the SSHO and communicated to employees by the work supervisor or contractor SSHO. Work/rest intervals are adjusted throughout the work shift as needed and communicated to each employee at the conclusion of an applicable rest period, prior to reentry into the work zone. Guidelines for work/rest schedules for this site must meet or exceed the ACGIH guidelines and FMC standards.

10.0 SPILL CONTAINMENT PROGRAM

This Section of the HASP describes the potential for hazardous substance spills at this site and procedures for controlling and containing such spills. The purpose of this Section of the HASP is to ensure that spill containment planning is conducted and appropriate control measures are established, consistent with OSHA requirements in 29 CFR 1910.120(b)(4)(ii)(J) and (j)(1)(viii).

10.1 Results of Evaluation for Potential Spills

The spill containment program addresses the following site-specific information:

- Potential hazardous substance spills and available controls
- Initial notification and response
- Spill evaluation and response, and
- Post-spill evaluation.

10.2 Potential Spills and Available Controls

There is a potential that a hazardous substance spill could potentially occur – depending on the contractor or work crew activity. Therefore, the following site-specific spill containment program has been implemented to address spill containment planning, equipment, and procedures. Site personnel are trained in the contents of this spill containment program and their roles and responsibilities during spill response operations.

Each contractor or work crew is responsible for identifying regulated or toxic materials that could spill or leak during site activities. Each contractor is required to have a readily available SDS and suitable spill response materials available.

10.3 Initial Spill Notification and Response

Any worker who discovers a hazardous substance spill will notify the Site Supervisor or the SSHO.

The worker reports, to his/her best ability, the hazardous substance involved, the location of the spill, the estimated quantity of substance spilled, the direction/flow of the spill material, related fire/explosion incidents, and any associated injuries.

10.4 Spill Evaluation and Response

Spill evaluation and response will be managed in accordance with the RCRA Contingency Plan and the Facility Emergency Action Plan.

11.0 DECONTAMINATION

The decontamination Section of the HASP describes how personnel and equipment are decontaminated when they leave the Exclusion Zone. This Section also describes how residual waste from decontamination processes is disposed. Decontamination procedures are designed to achieve an orderly, controlled removal or neutralization of contaminants that may accumulate on personnel or equipment. These procedures minimize worker contact with contaminants and protect against the transfer of contaminants outside designated work zones. They also extend the useful life of PPE by reducing the amount of time that contaminants contact and permeate PPE surfaces. The decontamination procedures described below are designed to meet the requirements of 1910.120(k) and include project-specific information about:

- The location and type of project decontamination facilities
- General and specific decontamination procedures for personnel and PPE
- General and specific decontamination procedures for equipment
- Disposal of residual waste from decontamination
- Decontamination equipment and solutions, and
- The monitoring procedures used to evaluate the effectiveness of decontamination.

Emergency decontamination procedures are detailed in the Emergency Response Section of this HASP.

The SHSO and Work Supervisor overseas implementation of project decontamination procedures and is responsible for ensuring their effectiveness.

11.1 Decontamination Facilities

Decontamination is conducted in the contamination reduction zone (CRZ). The CRZ acts as a buffer between the exclusion zone and the support zone. The location and design of decontamination stations minimize the spread of contamination beyond these stations. Separate facilities are used for personnel and for equipment. The location of these designated facilities will be established and clearly demarcated by each work crew. Only trained and authorized personnel are allowed in the CRZ.

11.2 Decontamination Procedures for Personnel and PPE

Decontamination procedures are designed for the level of PPE used. Project-specific procedures for personnel and PPE decontamination minimize the potential for hazardous skin or inhalation exposure, cross-contamination, and chemical incompatibilities.

General site decontamination requirements are described below:

- Decontamination is required for all workers exiting a contaminated area. Personnel may re-enter the Support Zone only after undergoing the decontamination procedures described in the next section.
- Used protective clothing is decontaminated, cleaned, laundered, maintained and/or replaced as needed to ensure its effectiveness.

- PPE that requires maintenance or parts replacement is decontaminated prior to repairs or service.
- PPE is decontaminated or prepared for appropriate disposal (each contractor is responsible for their own waste disposal; do not use FMC waste containers without written approval). Personnel who handle contaminated equipment have been trained in the proper means to do so to avoid hazardous exposure.
- Workers are required and trained to immediately exit the work zone, perform applicable decontamination procedures, shower, and change into uncontaminated clothing if their permeable clothing is splashed or becomes wetted with a hazardous substance.
- Procedures for decontamination waste disposal meet all applicable local, state, and federal regulations.
- Respirators and non-disposable PPE are decontaminated with a method/procedure that has proven to be effective for the material in use.

11.3 Decontamination Procedures for Equipment

All tools, equipment, and machinery from the Exclusion Zone or CRZ are decontaminated in the CRZ prior to removal to the Support Zone. Equipment decontamination procedures are designed to minimize the potential for hazardous skin or inhalation exposure, cross-contamination, and chemical incompatibilities.

The following are general equipment decontamination procedures established and implemented during this project. Specific procedures for equipment decontamination must be developed by each work crew/contractor.

General Equipment Decontamination Procedures:

- Equipment in the Exclusion Zone that can be used again, is still operable, and will not pose an increased exposure hazard during re-use is left in Exclusion Zone until it is no longer needed. This eliminates unnecessary decontamination and reduces the potential for physical transfer of contaminants outside the Exclusion Zone.
- Decontamination is required for all equipment exiting a contaminated area. Equipment may re-enter the Support Zone only after undergoing the equipment decontamination procedures described in Section 11.
- Equipment that is transported regularly between the contaminated and clean areas of the facility (e.g., monitoring equipment) is carefully decontaminated each time it is removed from the Exclusion Zone and the effectiveness of decontamination is monitored to reduce the likelihood that contamination will be spread outside designated work zones.
- Equipment that cannot be successfully decontaminated is disposed of as hazardous waste.

11.4 Monitoring the Effectiveness of Decontamination Procedures

Visual examination with confirmation sampling as necessary are used to evaluate the effectiveness of decontamination procedures, in compliance with 29 CFR 1910.120(k)(2)(iv). Visual examination is used to ensure that procedures are

implemented as described and that they appear to control the spread of contaminants under changing conditions. Where feasible, visual examination is also used to inspect for signs of residual contamination and contaminant permeation of PPE.

Both air sampling and surface sampling are used to verify the effectiveness of decontamination. Air samples are taken in the clean zone to ensure that airborne contaminants have not spread to clean areas of the facility. Surface samples are taken from the inside surfaces of PPE, from decontaminated equipment, and from surfaces within clean areas of the facility to ensure that decontamination and control procedures are performing as anticipated. The type and frequency of air and surface sampling used to ensure the effectiveness of decontamination procedures are detailed in the Exposure Monitoring Section of this HASP.

Results of the inspections of decontamination procedures and documentation of any action taken to correct deficiencies will be maintained by each contractor or agency working at the site.

Personnel who work in contaminated areas, either the Contamination Reduction Zone (CRZ) or the Exclusion Zone, are trained in the principles and practices of decontamination described in this Section of the HASP and in related SOPs. If procedures are changed as a result of inspection and monitoring, all affected employees are notified of these changes.

12.0 EMERGENCY RESPONSE PROCEDURES

12.1 Purpose and Scope of Plan

The Middleport Facility Emergency Action Plan (EAP) and RCRA Contingency Plan provide critical information to be used in the event of an emergency. Included in these plans are sections regarding:

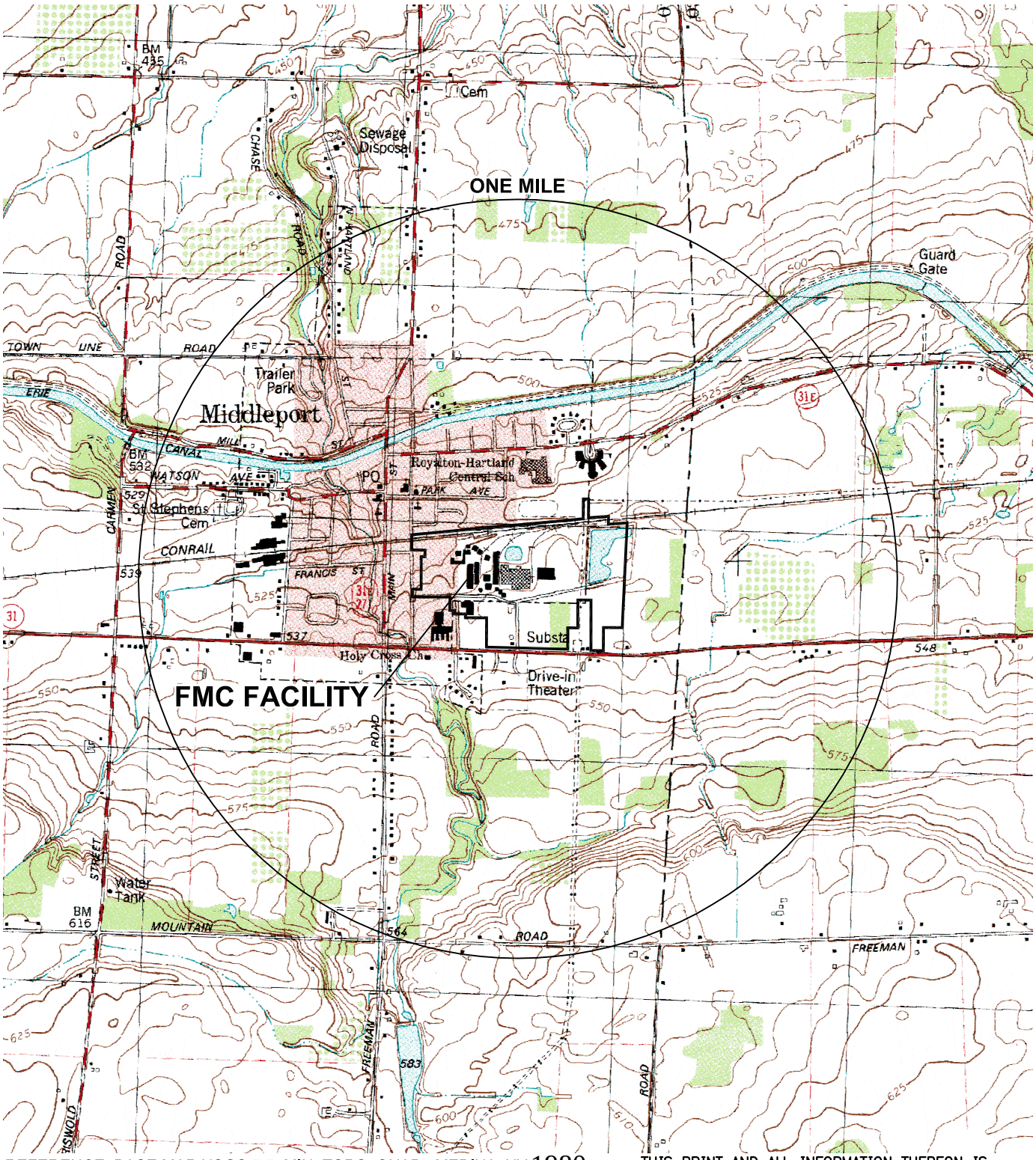
- Emergency Contacts
- Location and Routes to medical facilities, including the hospitals
- External emergency contact information
- Emergency response procedures and evacuation plans, and
- Post Emergency Procedures.

Copies of the EAP and RCRA Contingency Plan will be posted in the support zone at the work site, and a copy should be with all on-site personnel during field activities. In the event of any situation or unplanned occurrence requiring assistance, (e.g., fire, major injury, crime, major release), **CALL 911 FIRST** and then notify the SSHO.

12.2 Non-Regulatory Reporting Guidelines

Employees involved in or witnessing an injury, worker exposure, environmental incident, or near miss must immediately report it to the responsible supervisor or foreman, who in turn immediately relays the report to Facility EH&S Manager, or SSHO. No supervisor may decline to accept or relay a report of SH&E incident or significant near miss from a subordinate.

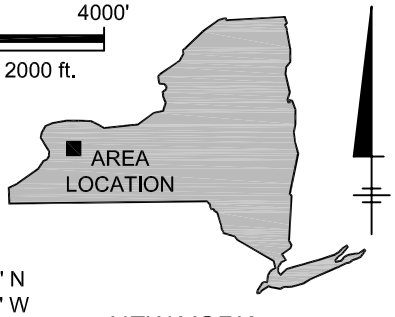
FIGURES



REFERENCE: BASE MAP USGS 7.5. MIN. TOPO. QUAD., MEDINA, NY 1980

0 2000' 4000'

Approximate Scale: 1 in. = 2000 ft.



FACILITY LOCATION:
LATITUDE 43° 12' 27" N
LONGITUDE 78° 28' 16" W

P:\FMC-Middleport and Dublin Road\Middleport Plant Site\HASP-Figures\CINCY_CAD\Fig 1 HASP-SLM_051215.dwg

FIGURE 1

FMC CORPORATION–MIDDLEPORT, NEW YORK
HEALTH AND SAFETY PLAN

SITE LOCATION MAP

PARSONS
40 LA RIVIERE DRIVE, SUITE 350, BUFFALO, NEW YORK 14202 PHONE: 716-541-0730

LEGEND:

STATE STREET

VERNON STREET

MAPLE AVENUE

FREEMAN AVENUE

ALFRED STREET

PARK AVENUE

ELIZABETH STREET

CEMETERY STREET

NIAGARA STREET

SOUTH VERNON STREET

TELEGRAPH ROAD

ROCHESTER ROAD

WSI

T-6008

TANK T-1102

TANK T-1101

26
27A
53
54
23-A
23-B
30
23
42
61A
61B
21
21B
21A
104
104A
48
71
65
70
72
49
75

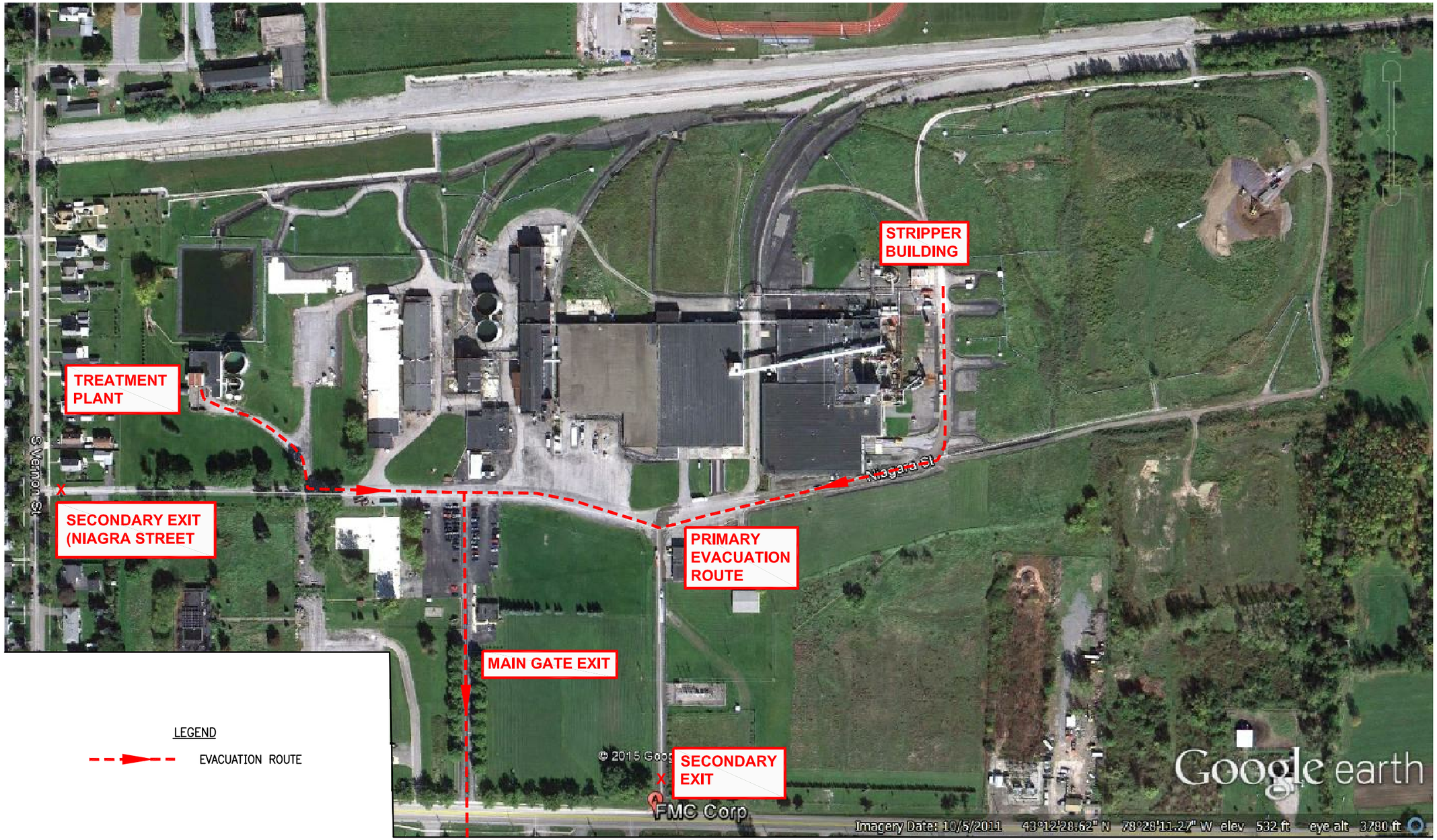
P::\FMC - Middleport and Dublin Road\Middleport Site\HASP-Figures\Fig 2_HASP-SITE PLAN_051115.dwg

FIGURE 2

FMC MIDDLEPORT SITE NIAGARA COUNTY, NEW YORK
HEALTH AND SAFETY PLAN

SITE PLAN

PARSONS
40 LA RIVIERE DRIVE, SUITE 350, BUFFALO. NEW YORK 14202 PHONE: 716-541-0730



LEGEND

EVACUATION ROUTE

0 240' 480'

GRAPHIC SCALE

FIGURE 3

FMC CORPORATION–MIDDLEPORT, NEW YORK
HEALTH AND SAFETY PLAN

SITE ACCESS AND EVACUATION ROUTES

PARSONS
40 LA RIVIERE DRIVE, SUITE 350, BUFFALO. NEW YORK 14202 PHONE: 716-541-0730

P:\FMC–Middleport and Dublin Road\Middleport Plant Site\HASP–Figures\Fig 3_HASP–Site Access & Evacuation Routes_050715.dwg

APPENDIX A
HASP TRAINING AND ACKNOWLEDGMENT FORM

SITE-SPECIFIC HEALTH AND SAFETY PLAN (HASP) TRAINING

I hereby confirm that site-specific health and safety training has been conducted by the site health and safety officer. Training included:

- Names of personnel responsible for site safety and health
- Safety, health, and other hazards at the site
- Proper use of personal protective equipment
- Work practices by which the employee can minimize risk from hazards
- Safe use of engineering controls and equipment on the site
- Acute effects of compounds at the site
- Decontamination procedures

For the following project:

_____	_____	_____
(Project Title)	(Project Number)	(City, State)

Name (print)	Signature	Company	Date

Maintain in Health & Safety Plan file.

APPENDIX B
SAFETY DATA SHEETS FOR SITE CONSTITUENTS OF CONCERN

Appendix B
Safety Data Sheets for Site Constituents of Concern

CAS 7664-41-7	Ammonia
CAS 7440-38-2	Arsenic
CAS N/A	BHC
CAS 1563-66-2	Carbofuran
CAS 181052-63-1	Methyl 2-(7-hydroxybenzofuran-3-y)acetate
CAS 50-29-3	4,4-DDT
CAS 4849-32-5	Karbutilate
CAS 75-09-2	Dichloromethane

SAFETY DATA SHEET

Version 3.7
Revision Date 12/16/2014
Print Date 05/06/2015

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name	:	Ammonia
Product Number	:	294993
Brand	:	Aldrich
Index-No.	:	007-001-00-5
CAS-No.	:	7664-41-7

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses	:	Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company	:	Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA
Telephone	:	+1 800-325-5832
Fax	:	+1 800-325-5052

1.4 Emergency telephone number

Emergency Phone #	:	(314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Flammable gases (Category 2), H221
Gases under pressure (Compressed gas), H280
Acute toxicity, Inhalation (Category 3), H331
Skin corrosion (Category 1B), H314
Serious eye damage (Category 1), H318
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)

H221	Flammable gas.
H280	Contains gas under pressure; may explode if heated.
H314	Causes severe skin burns and eye damage.
H318	Causes serious eye damage.
H331	Toxic if inhaled.
H410	Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)	
P210	Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P330 + P331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P310	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately call a POISON CENTER or doctor/ physician.
P305 + P351 + P338 + P310	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or doctor/ physician.
P363	Wash contaminated clothing before reuse.
P377	Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
P381	Eliminate all ignition sources if safe to do so.
P391	Collect spillage.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P410 + P403	Protect from sunlight. Store in a well-ventilated place.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	H_3N
Molecular weight	:	17.03 g/mol
CAS-No.	:	7664-41-7
EC-No.	:	231-635-3
Index-No.	:	007-001-00-5

Hazardous components

Component	Classification	Concentration
Ammonia, anhydrous		
	Flam. Gas 2; Press. Gas Compr. Gas; Acute Tox. 3; Skin Corr. 1B; Eye Dam. 1; Aquatic Acute 1; Aquatic Chronic 1; H221, H280, H314, H318, H331, H410	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Move out of dangerous area.Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.Continue rinsing eyes during transport to hospital.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Nitrogen oxides (NOx)

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Keep away from sources of ignition - No smoking.Take measures to prevent the build up of electrostatic charge.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

Contents under pressure.
Storage class (TRGS 510): Gases

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Ammonia, anhydrous	7664-41-7	TWA	25.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Upper Respiratory Tract irritation Eye damage		
		STEL	35.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Upper Respiratory Tract irritation Eye damage		
		TWA	50.000000 ppm 35.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		
		TWA	25.000000 ppm 18.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		Often used in an aqueous solution.		
		ST	35.000000 ppm 27.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		Often used in an aqueous solution.		
		TWA	25.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Upper Respiratory Tract irritation Eye damage		
		TWA	25.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Upper Respiratory Tract irritation Eye damage		
		STEL	35.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Upper Respiratory Tract irritation Eye damage		
		STEL	35.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Upper Respiratory Tract irritation Eye damage		
		TWA	25.000000 ppm 18.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		Often used in an aqueous solution.		
		TWA	25.000000 ppm 18.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		Often used in an aqueous solution.		
		ST	35.000000 ppm 27.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		Often used in an aqueous solution.		
		ST	35.000000 ppm 27.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		Often used in an aqueous solution.		

		TWA	50 ppm 35 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		
		STEL	35 ppm 27 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		TWA	25 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Upper Respiratory Tract irritation Eye damage		
		STEL	35 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Upper Respiratory Tract irritation Eye damage		
		TWA	25 ppm 18 mg/m3	USA. NIOSH Recommended Exposure Limits
		Often used in an aqueous solution.		
		ST	35 ppm 27 mg/m3	USA. NIOSH Recommended Exposure Limits
		Often used in an aqueous solution.		

8.2 Exposure controls

Appropriate engineering controls
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection
Tightly fitting safety goggles. Faceshield (8-inch minimum). Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: butyl-rubber
Minimum layer thickness: 0.3 mm
Break through time: 480 min
Material tested:Butoject® (KCL 897 / Aldrich Z677647, Size M)

Splash contact
Material: butyl-rubber
Minimum layer thickness: 0.3 mm
Break through time: 480 min
Material tested:Butoject® (KCL 897 / Aldrich Z677647, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators

and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: Compressed gas
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -78 °C (-108 °F) - lit.
f)	Initial boiling point and boiling range	-33 °C (-27 °F) - lit.
g)	Flash point	132 °C (270 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 25 %(V) Lower explosion limit: 15 %(V)
k)	Vapour pressure	6,402 hPa (4,802 mmHg) at 15.50 °C (59.90 °F) 8,866 hPa (6,650 mmHg) at 21 °C (70 °F)
l)	Vapour density	0.59 - (Air = 1.0)
m)	Relative density	0.590 g/cm3
n)	Water solubility	soluble
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

Relative vapour density	0.59 - (Air = 1.0)

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Heat, flames and sparks.

10.5 Incompatible materials
Oxidizing agents, Iron, Zinc, Copper, Silver/silver oxides, Cadmium/cadmium oxides, Alcohols, acids, Halogens, Aldehydes

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available

LC50 Inhalation - Rat - 4 h - 2000 ppm

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: BO0875000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Liver - Irregularities - Based on Human Evidence
Liver - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

No data available

Toxicity to daphnia and other aquatic invertebrates	LC50 - Daphnia magna (Water flea) - 25.4 mg/l - 48 h

12.2 Persistence and degradability

No data available

12.3 Bioaccumulative potential

No data available

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product

Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging

Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)

UN number: 1005 Class: 2.2
Proper shipping name: Ammonia, anhydrous
Reportable Quantity (RQ): 100 lbs

Poison Inhalation Hazard: Hazard zone D

IMDG

UN number: 1005 Class: 2.3 (8) EMS-No: F-C, S-U
Proper shipping name: AMMONIA, ANHYDROUS
Marine pollutant:yes

IATA

UN number: 1005 Class: 2.3 (8)
Proper shipping name: Ammonia, anhydrous
IATA Passenger: Not permitted for transport
IATA Cargo: Not permitted for transport

15. REGULATORY INFORMATION

SARA 302 Components

The following components are subject to reporting levels established by SARA Title III, Section 302:

	CAS-No.	Revision Date
Ammonia, anhydrous	7664-41-7	2007-03-01

SARA 313 Components

The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Ammonia, anhydrous	7664-41-7	2007-03-01

SARA 311/312 Hazards
Sudden Release of Pressure Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Ammonia, anhydrous	7664-41-7	2007-03-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Ammonia, anhydrous	7664-41-7	2007-03-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Ammonia, anhydrous	7664-41-7	2007-03-01

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Eye Dam.	Serious eye damage
Flam. Gas	Flammable gases
H221	Flammable gas.
H280	Contains gas under pressure; may explode if heated.
H314	Causes severe skin burns and eye damage.
H318	Causes serious eye damage.
H331	Toxic if inhaled.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

HMIS Rating

Health hazard:	3
Chronic Health Hazard:	*
Flammability:	1
Physical Hazard	1

NFPA Rating

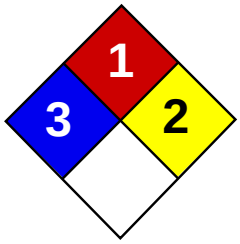
Health hazard:	3
Fire Hazard:	0
Reactivity Hazard:	0

Further information

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information
Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 3.7 Revision Date: 12/16/2014 Print Date: 05/06/2015



Health	3
Fire	1
Reactivity	2
Personal Protection	E

Material Safety Data Sheet
Arsenic MSDS

Section 1: Chemical Product and Company Identification

Product Name: Arsenic

Catalog Codes: SLA1006

CAS#: 7440-38-2

RTECS: CG0525000

TSCA: TSCA 8(b) inventory: Arsenic

CI#: Not applicable.

Synonym:

Chemical Name: Arsenic

Chemical Formula: As

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Arsenic	7440-38-2	100

Toxicological Data on Ingredients: Arsenic: ORAL (LD50): Acute: 763 mg/kg [Rat]. 145 mg/kg [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant), of eye contact (irritant).

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to kidneys, lungs, the nervous system, mucous membranes. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Flammable in presence of open flames and sparks, of heat, of oxidizing materials.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards:
Material in powder form, capable of creating a dust explosion. When heated to decomposition it emits highly toxic fumes.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable

protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents, acids, moisture.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 0.01 from ACGIH (TLV) [United States] [1995] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Lustrous solid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 74.92 g/mole

Color: Silvery.

pH (1% soln/water): Not applicable.

Boiling Point: Not available.

Melting Point: Sublimation temperature: 615°C (1139°F)

Critical Temperature: Not available.

Specific Gravity: 5.72 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water, hot water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Reactive with oxidizing agents, acids, moisture.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 145 mg/kg [Mouse].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH. Causes damage to the following organs: kidneys, lungs, the nervous system, mucous membranes.

Other Toxic Effects on Humans:
Very hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are as toxic as the original product.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: : Arsenic UNNA: UN1558 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Arsenic California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Arsenic Pennsylvania RTK: Arsenic Massachusetts RTK: Arsenic TSCA 8(b) inventory: Arsenic

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):
CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R22- Harmful if swallowed. R45- May cause cancer.

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 1

Reactivity: 2

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 3

Flammability: 1

Reactivity: 2

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Safety glasses.

Section 16: Other Information

References:
-Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987. -Liste des produits purs tératogènes, mutagènes, cancérogènes. Répertoire toxicologique de la Commission de la Santé et de la Sécurité du Travail du Québec. -Material safety data sheet emitted by: la Commission de la Santé et de la Sécurité du Travail du Québec. -SAX, N.I. Dangerous Properties of Indutrial Materials. Toronto, Van Nostrand Reinold, 6e ed. 1984. -The Sigma-Aldrich Library of Chemical Safety Data, Edition II. -Guide de la loi et du règlement sur le transport des marchandises dangeureuses au canada. Centre de conformité internatinal Ltée. 1986.

Other Special Considerations: Not available.

Created: 10/09/2005 04:16 PM

Last Updated: 05/21/2013 12:00 PM

Vanderbilt Chemicals, LLC
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SAFETY DATA SHEET

Europe
English

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Product name VANLUBE® BHC

Product Code 50460

Chemical name benzenepropanoic acid, 3,5-bis(1,1-dimethylethyl)-4-hydroxy-, C7-9-branched alkyl esters

CAS number Not available.

REACH Registration number 01-0000015551-76-0014

Other means of identification 3,5-Bis(1,1-Dimethylethyl)-4-hydroxybenzenepropanoic acid branched alkyl (C=7-9) ester

Product type Liquid.

1.2 Relevant identified uses of the substance or mixture and uses advised against

Lubricant additives

1.3 Details of the supplier of the safety data sheet

Vanderbilt Chemicals, LLC
30 Winfield Street
Norwalk, CT 06855

e-mail address of person responsible for this SDS

SDS@vanderbiltglobalservices.com

National contact

Vanderbilt Worldwide Ltd
Unit 12, Alvaston Business Park,
Middlewich Road, Nantwich,
Cheshire CW5 6PF
United Kingdom

Telephone number: +44 1270 623978

1.4 Emergency telephone number

National advisory body/Poison Center

Telephone number Chemtrec: +1-800-424-9300
Outside US: +1-703-527-3887

Supplier

Telephone number 1-203-853-1400

Hours of operation 24 hours

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Product definition Mono-constituent substance

Classification according to Regulation (EC) No. 1272/2008 [CLP/GHS]

The product is classified as hazardous according to Regulation (EC) 1272/2008 as amended.

Classification Aquatic Chronic 4, H413

Classification according to Directive 67/548/EEC [DSD]

R53

See Section 16 for the full text of the R phrases or H statements declared above.

2.2 Label elements

Hazard pictograms CLP Symbol Not Applicable

Signal word No signal word.

Hazard statements May cause long lasting harmful effects to aquatic life.

Precautionary statements

General Not applicable.

Prevention Avoid release to the environment.

Response Not applicable.

Storage Not applicable.

Disposal Dispose of contents and container in accordance with all local, regional, national and international regulations.

Annex XVII - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles Not applicable.

2.3 Other hazards

Substance meets the criteria for PBT according to Regulation (EC) No. 1907/2006, Annex XIII No.
P: Not available. B: Not available. T: No.

Substance meets the criteria for vPvB according to Regulation (EC) No. 1907/2006, Annex XIII Not available.

Other hazards which do not result in classification None known.

SECTION 3: Composition/information on ingredients

Substance/mixture Mono-constituent substance

SECTION 3: Composition/information on ingredients

Ingredient name	Identifiers	% by weight	Classification		Type
			67/548/EEC	Regulation (EC) No. 1272/2008 [CLP]	
Benzenepropanoic acid, 3, 5-bis(1,1-dimethylethyl) -4-hydroxy-, C7-9-branched alkyl esters	REACH #: 01-0000015551-XX-XXXX EC: 406-040-9 CAS: 125643-61-0	>97	R53	Aquatic Chronic 4, H413	[1]

There are no additional ingredients present which, within the current knowledge of the supplier, are classified and contribute to the classification of the substance and hence require reporting in this section.

See Section 16 for the full text of the R-phrases declared above.

See Section 16 for the full text of the H statements declared above.

Type

[A] Constituent
[B] Impurity
[C] Stabilizing additive

Occupational exposure limits, if available, are listed in Section 8.

SECTION 4: First aid measures

4.1 Description of first aid measures

Eye contact

Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention if irritation occurs.

Inhalation

Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention if adverse health effects persist or are severe. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Skin contact

Wash contaminated skin with soap and water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion

Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention if adverse health effects persist or are severe. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Protection of first-aiders

No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

4.2 Most important symptoms and effects, both acute and delayed

Potential acute health effects

SECTION 4: First aid measures

Eye contact No known significant effects or critical hazards.

Inhalation No known significant effects or critical hazards.

Skin contact No known significant effects or critical hazards.

Ingestion No known significant effects or critical hazards.

Over-exposure signs/symptoms

Eye contact No specific data.

Inhalation No specific data.

Skin contact No specific data.

Ingestion No specific data.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

Specific treatments No specific treatment.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media None known.

5.2 Special hazards arising from the substance or mixture

Hazards from the substance or mixture In a fire or if heated, a pressure increase will occur and the container may burst. This material may cause long lasting harmful effects to aquatic life. Fire water contaminated with this material must be contained and prevented from being discharged to any waterway, sewer or drain.

Hazardous thermal decomposition products Decomposition products may include the following materials:
carbon dioxide
carbon monoxide

5.3 Advice for firefighters

Special protective actions for fire-fighters Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.

Special protective equipment for fire-fighters Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode. Clothing for fire-fighters (including helmets, protective boots and gloves) conforming to European standard EN 469 will provide a basic level of protection for chemical incidents.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

For non-emergency personnel No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

SECTION 6: Accidental release measures

For emergency responders

If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

6.2 Environmental precautions

Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Water polluting material. May be harmful to the environment if released in large quantities.

6.3 Methods and materials for containment and cleaning up

Small spill

Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

Large spill

Stop leak if without risk. Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations. Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product.

6.4 Reference to other sections

See Section 1 for emergency contact information.
See Section 8 for information on appropriate personal protective equipment.
See Section 13 for additional waste treatment information.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Protective measures

Put on appropriate personal protective equipment (see Section 8). Do not ingest. Avoid contact with eyes, skin and clothing. Avoid breathing vapor or mist. Avoid release to the environment. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container.

Advice on general occupational hygiene

Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

7.2 Conditions for safe storage, including any incompatibilities

Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

7.3 Specific end use(s)

Recommendations

Not available.

Industrial sector specific solutions

Not available.

SECTION 8: Exposure controls/personal protection

The information in this section contains generic advice and guidance. Information is provided based on typical anticipated uses of the product. Additional measures might be required for bulk handling or other uses that could significantly increase worker exposure or environmental releases.

8.1 Control parameters

Occupational exposure limits

No exposure limit value known.

Recommended monitoring procedures

If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment. Reference should be made to monitoring standards, such as the following: European Standard EN 689 (Workplace atmospheres - Guidance for the assessment of exposure by inhalation to chemical agents for comparison with limit values and measurement strategy) European Standard EN 14042 (Workplace atmospheres - Guide for the application and use of procedures for the assessment of exposure to chemical and biological agents) European Standard EN 482 (Workplace atmospheres - General requirements for the performance of procedures for the measurement of chemical agents) Reference to national guidance documents for methods for the determination of hazardous substances will also be required.

DNELs/DMELs

No DNELs/DMELs available.

PNECs

No PNECs available.

8.2 Exposure controls

Appropriate engineering controls

Good general ventilation should be sufficient to control worker exposure to airborne contaminants.

Individual protection measures

Hygiene measures

Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection

Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields. Recommended: splash goggles

Skin protection

Hand protection

Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection

Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. Recommended: lab coat

Other skin protection

Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

SECTION 8: Exposure controls/personal protection

Respiratory protection

Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Environmental exposure controls

Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Personal protective equipment (Pictograms)

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance

Physical state	Liquid.
Color	Yellowish.
Odor	Light
Odor threshold	Not available.
pH	Not available.
Melting point/freezing point	-23°C
Initial boiling point and boiling range	370.65°C
Flash point	Closed cup: 126°C
Evaporation rate	Not available.
Flammability (solid, gas)	Not available.
Upper/lower flammability or explosive limits	Not available.
Vapor pressure	0.000002 kPa [room temperature]
Vapor density	Not available.
Relative density	0.95 to 0.99
Solubility(ies)	Not available.
Solubility in water	0.000121 g/l
Partition coefficient: n-octanol/ water	7.18 at at 30°C (Log Pow)
Auto-ignition temperature	356°C
Decomposition temperature	Not available.
Viscosity	Kinematic (room temperature): 0.062 cm^2/s
Explosive properties	Not available.
Oxidizing properties	Not available.

9.2 Other information

No additional information.

SECTION 10: Stability and reactivity

10.1 Reactivity No specific test data related to reactivity available for this product or its ingredients.

10.2 Chemical stability The product is stable.

10.3 Possibility of hazardous reactions Under normal conditions of storage and use, hazardous reactions will not occur.

10.4 Conditions to avoid No specific data.

10.5 Incompatible materials No specific data.

10.6 Hazardous decomposition products Under normal conditions of storage and use, hazardous decomposition products should not be produced.

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Benzenepropanoic acid, 3, 5-bis(1,1-dimethylethyl) -4-hydroxy-, C7-9-branched alkyl esters	LD50 Dermal	Rat	>2000 mg/kg	-
	LD50 Oral	Rat	>2000 mg/kg	-

Irritation/Corrosion

Conclusion/Summary

Skin Non-irritating to the skin. (Rabbit)

Eyes Non-irritating to the eyes. (Rabbit)

Sensitization

Product/ingredient name	Route of exposure	Species	Result
Benzenepropanoic acid, 3, 5-bis(1,1-dimethylethyl) -4-hydroxy-, C7-9-branched alkyl esters	skin	Guinea pig	Not sensitizing

Conclusion/Summary

Skin Not available.

Mutagenicity

Product/ingredient name	Test	Experiment	Result
Benzenepropanoic acid, 3, 5-bis(1,1-dimethylethyl) -4-hydroxy-, C7-9-branched alkyl esters	OECD 473	Experiment: In vitro Subject: Mammalian-Animal	Negative

Carcinogenicity

Conclusion/Summary Not available.

SECTION 11: Toxicological information

Reproductive toxicity

Conclusion/Summary When benzenepropanoic acid, 3,5-bis(1,1-dimethylethyl)-4-hydroxy-,C7-9-branched alkyl esters was administered orally to mice for a duration of 8 weeks, the NOAEL for reproduction and developmental toxicity was 600 mg/kg bw/day, respectively.

Teratogenicity

Conclusion/Summary When benzenepropanoic acid, 3,5-bis(1,1-dimethylethyl)-4-hydroxy-,C7-9-branched alkyl esters was administered orally to rabbits for a duration of 22 days, the NOAEL for maternal and developmental toxicity was 40 mg/kg bw/day, respectively. The LOAEL for maternal and developmental toxicity was 80 mg/kg bw/day, respectively.

Specific target organ toxicity (single exposure)

Not available.

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Not available.

Information on the likely routes of exposure Routes of entry anticipated: Dermal.

Potential acute health effects

Eye contact No known significant effects or critical hazards.

Inhalation No known significant effects or critical hazards.

Skin contact No known significant effects or critical hazards.

Ingestion No known significant effects or critical hazards.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact No specific data.

Inhalation No specific data.

Skin contact No specific data.

Ingestion No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects Not available.

Potential delayed effects Not available.

Long term exposure

Potential immediate effects Not available.

Potential delayed effects Not available.

Potential chronic health effects

Product/ingredient name	Result	Species	Dose	Exposure
Benzenepropanoic acid, 3, 5-bis(1,1-dimethylethyl) -4-hydroxy-, C7-9-branched alkyl esters	Sub-acute NOAEL Oral	Rat	5 mg/kg	-

General No known significant effects or critical hazards.

Carcinogenicity No known significant effects or critical hazards.

Mutagenicity No known significant effects or critical hazards.

SECTION 11: Toxicological information

Teratogenicity No known significant effects or critical hazards.

Developmental effects No known significant effects or critical hazards.

Fertility effects No known significant effects or critical hazards.

Other information Not available.

SECTION 12: Ecological information

12.1 Toxicity

Product/ingredient name	Result	Species	Exposure
Benzenepropanoic acid, 3, 5-bis(1,1-dimethylethyl) -4-hydroxy-, C7-9-branched alkyl esters	NOEC >3 mg/l	Algae	72 hours
	Acute EC50 >100 mg/l	Daphnia	48 hours
	Acute LC50 >100 mg/l	Fish - Oncorhynchus mykiss	14 days
	Chronic NOEC <0.01 mg/l	Daphnia	21 days
	Chronic NOEC 0.001 mg/l	Fish - Danio rerio	36 days

Conclusion/Summary No effects at its water solubility.
Tested above the maximum solubility.

12.2 Persistence and degradability

Conclusion/Summary Not available.

Product/ingredient name	Aquatic half-life	Photolysis	Biodegradability
Benzenepropanoic acid, 3, 5-bis(1,1-dimethylethyl) -4-hydroxy-, C7-9-branched alkyl esters	-	-	Not readily

12.3 Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
VANLUBE® BHC	7.18	-	high

12.4 Mobility in soil

Soil/water partition coefficient (K_{OC}) Not available.

Mobility Not available.

12.5 Results of PBT and vPvB assessment

PBT No.
P: Not available. B: Not available. T: No.

vPvB Not available.
vP: Not available. vB: Not available.

12.6 Other adverse effects

No known significant effects or critical hazards.

SECTION 13: Disposal considerations

The information in this section contains generic advice and guidance. The list of Identified Uses in Section 1 should be consulted for any available use-specific information provided in the Exposure Scenario(s).

13.1 Waste treatment methods

Product

Methods of disposal

The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction.

Hazardous waste

The classification of the product may meet the criteria for a hazardous waste.

Packaging

Methods of disposal

The generation of waste should be avoided or minimized wherever possible. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible.

Special precautions

This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

SECTION 14: Transport information

Regulatory information	UN number	Proper shipping name	Classes	PG*	Label	Additional information
DOT Classification	Not regulated.	-	-	-		-
TDG Classification	Not regulated.	-	-	-		-
ADR/RID Class	Not regulated.	-	-	-		-
IMDG Class	Not regulated.	-	-	-		-
IATA-DGR Class	Not regulated.	-	-	-		-

PG* : Packing group

SECTION 15: Regulatory information

Europe inventory

At least one component is not listed in EINECS but all such components are listed in ELINCS. Please contact your supplier for information on the inventory status of this material.

EINECS: European Inventory. This product contains the following chemical(s) for which one or more Pre-Market Notifications have been filed. Should you wish to export products containing this product into an EC country, contact Product Risk Manager at Vanderbilt Global Services, LLC at 203-295-2143 for more information.Chemical name: benzenepropanoic acid, 3,5-bis(1, 1-dimethylethyl)-4-hydroxy-, C7-9-branched alkyl esters
CAS no. 125643-61-0

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

EU Regulation (EC) No. 1907/2006 (REACH)

Annex XIV - List of substances subject to authorization

Annex XIV

SECTION 15: Regulatory information

None of the components are listed.

Substances of very high concern

None of the components are listed.

Annex XVII - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles Not applicable.

Other EU regulations

Seveso II Directive

This product is not controlled under the Seveso II Directive.

National regulations

Germany

Hazard class for water 1 Appendix No. 3

International regulations

Chemical Weapon Convention List Schedules I, II & III Chemicals

Not listed.

Montreal Protocol (Annexes A, B, C, E)

Not listed.

Stockholm Convention on Persistent Organic Pollutants

Not listed.

Rotterdam Convention on Prior Inform Consent (PIC)

Not listed.

UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

International lists

United States inventory (TSCA 8b)	All components are listed or exempted.
Canada inventory	All components are listed or exempted.
Australia inventory (AICS)	All components are listed or exempted.
China inventory (IECSC)	All components are listed or exempted.
Japan inventory	At least one component is not listed.
Korea inventory	All components are listed or exempted.
New Zealand Inventory of Chemicals (NZIoC)	All components are listed or exempted.
Philippines inventory (PICCS)	All components are listed or exempted.

15.2 Chemical Safety Assessment This product contains substances for which Chemical Safety Assessments are still required.

SECTION 16: Other information

Indicates information that has changed from previously issued version.

SECTION 16: Other information

Abbreviations and acronyms

ATE = Acute Toxicity Estimate
CLP = Classification, Labelling and Packaging Regulation [Regulation (EC) No. 1272/2008]
DMEL = Derived Minimal Effect Level
DNEL = Derived No Effect Level
EUH statement = CLP-specific Hazard statement
PBT = Persistent, Bioaccumulative and Toxic
PNEC = Predicted No Effect Concentration
RRN = REACH Registration Number
vPvB = Very Persistent and Very Bioaccumulative

Procedure used to derive the classification according to Regulation (EC) No. 1272/2008 [CLP/GHS]

Classification	Justification
Aquatic Chronic 4, H413	Expert judgment

Europe

Full text of abbreviated H statements

H413	May cause long lasting harmful effects to aquatic life.

Full text of classifications [CLP/GHS]

Aquatic Chronic 4, H413	AQUATIC HAZARD (LONG-TERM) - Category 4

Full text of abbreviated R phrases

R53- May cause long-term adverse effects in the aquatic environment.

Full text of classifications [DSD/DPD]

Not applicable.

History

Date of printing 3/30/2015.

Date of issue/ Date of revision 3/30/2015.

Date of previous issue 6/25/2014.

Version 3

Information contact

Vanderbilt Global Services, LLC
Corporate Risk Management
1-203-295-2143

Notice to reader

Information presented herein has been compiled from sources considered to be dependable and is accurate and reliable to the best of our knowledge and belief but is not guaranteed to be so. Nothing herein is to be construed as recommending any practice or any product in violation of any patent or in violation of any law or regulation. It is the user's responsibility to determine for himself the suitability of any material for a specific purpose and to adopt such safety precautions as may be necessary. We make no warranty as to the results to be obtained in using any material and, since conditions of use are not under our control, we must necessarily disclaim all liability with respect to the use of any material supplied by us.

CARBOFURAN 100 GR MATERIAL SAFETY DATA SHEET

1. IDENTIFICATION OF THE SUBSTANCE

Product Name: **CARBOFURAN 100 GR**
Insecticide
Common Name: **Carbofuran**
Chemical Name: 2,3-dihy-2,2-dimethylbenzofuran-7-yl methylcarbamate (**IUPAC**)
CAS Nº.: 1563-66-2
Chemical family: Carbamate
Chemical formula: $C_{12}H_{15}NO_3$ (Mol. wt.: 221.26)
Use: Systemic insecticide, nematicide and acaricide with predominantly contact and stomach action.
Formulation: **Carbofuran** 100 g/kg Granules
UN No.: 2757
NIOSH/RTECS no. FB 9450000

Supplier: **Universal Crop Protection (Pty) Ltd**.
PO Box 801
Kempton Park, 1620, South Africa
Telephone: (011) 396 2233
Fax: (011) 396 4666
Website: www.villacrop.co.za

Emergency telephone: (011) 396 2233
083 326 9272

24 Hr Emergency Numbers:

Bateleur Trauma: 0860 333 911
(Client: Villa Crop Protection)
Tygerberg Poison Information Centre: (021) 931 6129
Red Cross Poison Information Centre: (021) 689 5227
Griffon Poison Information Centre: 082 446 8946

2. COMPOSITION / INFORMATION ON INGREDIENTS

Hazardous component: **Carbofuran**
Symbols T+
Risk-Phrases R26/28, R50
EEC No. 216-353-0

3. HAZARD IDENTIFICATION

Toxicity class: WHO Ib
Main hazard: **Carbofuran** is a carbamate compound which inhibits cholinesterase. It is of very high toxicity. Contact with skin, inhalation of dust or granules, or swallowing may be fatal.
Toxic to fish.
Toxic to bees (the active but not in a granular form).
Flammability: Not flammable.
Biological hazards: May be absorbed from the gastrointestinal tract, through the intact skin, and through inhalation of dust.

4. FIRST AID MEASURES AND PRECAUTIONS

Proper care should be taken during occupational use to avoid any inhalation of dust and granule particles, and to prevent accidental contamination of food products and water.
Inhalation:
Carbamate: Cholinesterase inhibitor.
Acute exposure:
When inhaled, the first effects of cholinesterase inhibition are usually respiratory and may include nasal hyperaemia and watery discharge, chest discomfort, dyspnea and wheezing due to increased bronchial secretions and bronchoconstriction. Other systemic effects may begin within a few minutes or several hours of exposure. Symptoms may include nausea, vomiting, diarrhoea, abdominal cramps, headache, vertigo, ocular pain, ciliary muscle spasm, blurring or dimness of vision, miosis, or in some cases mydriasis, lacrimation, salivation, sweating, and confusion. Other reported central nervous system or neuromuscular effects include ataxia, slurred speech, weakness, fatigue, twitching, fasciculation, tremor, and eventually paralysis of the extremities and possibly of the respiratory muscles. In severe cases, there may also be involuntary defecation and urination, bradycardia, hypotension, pulmonary oedema, convulsions, coma, and death from respiratory failure or cardiac arrest. **Carbofuran** does not accumulate in mammalian tissue and the cholinesterase inhibition reverses rather rapidly. In non-fatal cases, the illness generally lasts less than 24 hours.
Chronic exposure:
Prolonged or repeated exposure may cause effects as described in acute exposure.
First aid:
Remove from exposure area to fresh air immediately. If breathing has stopped, give mechanical artificial respiration (not direct mouth-to-mouth). Maintain airway and blood pressure and administer oxygen if available. Keep affected person warm and at rest. Treat symptomatically and supportively. Administration of oxygen should be performed by qualified personnel. Get medical attention immediately.
Skin contact:
Carbamate: Cholinesterase inhibitor.

Acute exposure:
Some compounds may cause irritation. Localised sweating and fasciculation may occur at the site of contact. If sufficient amounts are absorbed through the skin, other effects of cholinesterase inhibition may occur as described in acute inhalation. Symptoms may be delayed for 2 to 3 hours, usually no more than 8 hours.
Chronic exposure:
Repeated or prolonged exposure may cause effects as described in acute exposure.
First aid:
Remove contaminated clothing immediately. Wash contaminated areas with soap and water followed by alcohol. Emergency personnel should wear gloves and avoid contamination. Treat respiratory difficulty with mechanical artificial respiration. Get medical attention immediately.

Eye contact:
Carbamate: Cholinesterase inhibitor.
Acute exposure:
Direct contact may cause pain, hyperaemia, lacrimation, twitching of the eyelids, miosis, and ciliary muscle spasm with loss of accommodation, blurred or dimmed vision and browache. Sometimes mydriasis may occur instead of miosis. With sufficient exposure, other symptoms of cholinesterase inhibition may occur as described in acute inhalation.
Chronic exposure:
Prolonged exposure may cause effects as described in acute exposure. Some compounds have caused toxic effects on the crystalline lens, conjunctival thickening and obstruction of nasolacrimal canals when used as miotic eye drops.
First aid:
Irrigate eyes with water or saline solution. If symptoms of poisoning occur, treat respiratory difficulty with mechanical artificial respiration and oxygen. Observe patient for at least 24 to 36 hours. Get medical attention immediately. Oxygen should be administered by qualified medical personnel.

Ingestion:
Carbamate: Cholinesterase inhibitor.
Acute exposure:
When ingested, the first effects may be nausea, vomiting, anorexia, abdominal cramps, and diarrhoea. With absorption from the gastrointestinal tract, the other effects of cholinesterase inhibition as described in acute inhalation may occur. Symptoms may begin within minutes or be delayed several hours.
Chronic exposure:
Repeated ingestion may cause effects as described in acute exposure.
First aid:
If person is alert and respiration is not depressed, give syrup of Ipecac followed by water (if vomiting occurs, keep head below hips to prevent aspiration). If consciousness level declines or vomiting has not occurred in 15 minutes empty stomach by gastric lavage with the aid of cuffed endotracheal tube using isotonic saline or 5 % sodium bicarbonate follow with activated charcoal. Establish and maintain airway. Treat respiratory difficulty with artificial respiration and oxygen. **Do not give morphine, aminophylline, phenothiazines, reserpine, furosemide, or ethacrynic acid. Drugs like 2 PAM are not effective in poisoning with Carbofuran AND SHOULD NOT BE USED.**
Treat symptomatically and supportively. Administration of oxygen and gastric lavage must be performed by qualified medical personnel. Get medical attention immediately.

Advice to physician:
Antidote:
The following antidote has been recommended. However, the decision as to whether the severity of poisoning requires administration of any antidote and actual dose required should be made by qualified medical personnel.
For cholinesterase inhibitors: Establish clear airway and tissue oxygenation by aspiration of secretions, and if necessary, by assisted pulmonary ventilation with oxygen. Improve tissue oxygenation as much as possible before administrating atropine to minimise the risk of ventricular fibrillation. Administer atropine sulphate intravenously, or intramuscularly if iv injection is not possible. In moderately severe poisoning administer atropine sulphate, 0.4 to 2.0 mg repeated every 15 minutes, until atropinization is achieved (tachycardia, flushing, dry mouth, mydriasis). Maintain atropinization by repeated doses for 2 to 12 hours, or longer, depending on the severity of poisoning. The appearance of rales in the lung bases, miosis, salivation, nausea, bradycardia, are all indications of inadequate atropinization. Severely poisoned individuals may exhibit remarkable tolerance to atropine. Two or more times the dosages suggested above may be needed. Persons not poisoned or only slightly poisoned, however, may develop signs of atropine toxicity from such large dosages: fever, muscle fibrillations, and delirium are main signs of atropine toxicity. If these signs appear while the patient is fully atropinized, atropine administration should be discontinued, at least temporarily. Observe treated patients closely at least 24 hours to ensure that symptoms (possibly pulmonary oedema) do not recur as atropinization wears off. In very

severe poisonings, metabolic disposition of toxicant may require several hours or days during which atropinization must be maintained. Markedly lower levels of urinary metabolites indicate that atropine dosage can be tapered off. As the dosage is reduced, check the lung bases frequently for rales. If rales are heard or other symptoms return, re-establish atropinization promptly.

5. FIRE FIGHTING MEASURES

Fire and explosion hazard:
Not flammable. Toxic dust and irritating fumes may be produced during fires.
Extinguishing agents:
Extinguish **small fires** with carbon dioxide, dry chemical, water spray or standard foam. For **larger fires**, use dry chemical, "alcohol" foam, Halon, or carbon dioxide to fight fire.
Personal protective equipment:
Fire may produce irritating or poisonous vapours (toxic oxides of nitrogen), mists or other products of combustion. Fire-fighters and others that may be exposed should wear full protective clothing and self-contained breathing apparatus.

6. ACCIDENTAL RELEASE MEASURES (SPILLAGE)

Personal precautions:
Avoid contact with skin and eyes. Do not breathe in dust or fumes. For personal protection see Section 8.
Environmental precautions:
Do not allow to enter drains or water courses. When the product contaminates public waters, inform appropriate authorities immediately in accordance with local regulations.
Occupational spill:
Small spills: Do not touch spilled material. Stop leak if you can do so without risk. Use water spray to reduce vapours (contain any water used). Neutralise with sodium hydroxide and allow standing for 4 hours. Sweep up with sand or other suitable absorbent material and place into containers for later disposal. Move containers from spill area.
Larger spills: Contain material far ahead of spill for later disposal. Keep spectators away. Isolate hazard area and deny entry. Ventilate closed spaces before entering.

7. HANDLING AND STORAGE REQUIREMENTS

Handling:
Highly toxic if swallowed. Avoid contact with eyes, prolonged contact with skin, and inhalation of dust and vapour. Use with adequate ventilation. Wash hands before eating, drinking, chewing gum, smoking, or using the toilet. Remove clothing immediately if the insecticide gets inside. Then wash skin thoroughly using a non-abrasive soap and put on clean clothing. Do not apply directly to areas where surface water is present, or to intertidal areas below the mean high water mark. Water used to clean equipment must be disposed of correctly to avoid contamination.
Storage:
The product must be kept under lock and key. Keep out of reach of unauthorised persons, children and animals. Store in its original labelled container in shaded, well-ventilated area, away from heat, sparks and other sources of ignition. Not to be stored next to foodstuffs and water supplies. Local regulations should be complied with.

8. EXPOSURE CONTROL/PERSONAL PROTECTION

Occupational exposure limits:
NIOSH: REL-air: 10H TWA 0.1 mg/m^3.
ACGIH 1993-1993: TLV: ppm; 0.1 mg/m^3
Engineering control measures:
It is essential to provide adequate ventilation. The measures appropriate for a particular work site depend on how this material is used and on the extent of exposure. Ensure that control systems are properly designed and maintained. Comply with occupational safety, environmental, fire, and other applicable regulations. If engineering controls and work practices are not effective in controlling exposure to this material, then wear suitable personal protective equipment including approved respiratory protection.
Personal protective equipment:
Respirator:
An approved respirator suitable for protection from dusts and mists of pesticides is adequate. Limitations of respirator use specified by the approved agency and the manufacturer must be observed.
Clothing:
Employee must wear appropriate protective (impervious) clothing and equipment to prevent repeated or prolonged skin contact with the substance.
Gloves:
Employee must wear appropriate synthetic protective gloves to prevent contact with this substance.
Eye protection:
The use of full face protection is recommended.
Emergency eye wash: Where there is any possibility that an employee's eyes may be exposed to this substance; the employer should provide an eye wash

fountain or appropriate alternative within the immediate work area for emergency use.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance:
Free-flowing granules.
Odour:
Odourless to very faint phenolic odour.
Bulk density:
135 to 140 g/100 mℓ at 20^{o}C
Storage stability:
Considered stable for a period of 2 years from date of manufacture when stored under normal warehouse conditions in normal air and light conditions.
Explosive properties:
Non-explosive.
Solubility in organic solvents:
(All solubility figures in g/ℓ at 20^{o}C for active material)

dichloromethane:	> 200
isopropanol:	20 to 50
toluene:	10 to 20

Solubility in water:
NIL *for formulated product*

10. STABILITY AND REACTIVITY

Stability:
Stable in acidic and neutral media, but rapidly hydrolysed in alkaline media. The rate of decomposition increases at higher temperatures. **Carbofuran** is stable to light. Stable up to 130 ^{o}C.
Efficacy may be adversely affected when used in alkaline, brackish soils or in soils of pH above pH 7.
Incompatibility:
The product is incompatible with alkaline products.
Thermal decomposition:
Toxic oxides of nitrogen are released when the product decomposes on heating.

11. TOXICOLOGICAL INFORMATION

Acute oral LD_{50}:
82 mg/kg in rats.
Acute dermal LD_{50}:
>2 000 mg/kg in rats.
Acute inhalation LC_{50}:
Due to low volatility study was not conducted.
Acute skin irritation:
Non-irritating to skin (rabbit).
Acute eye irritation:
Non-irritant (rabbit)
Allergic sensitization:
None significant
Carcinogenicity:
No a carcinogen.
Teratogenicity:
Not teratogenic.
Mutagenicity:
Animal studies did not detect any mutagenic activity. No human information available.

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGY:
Data as for technical material:
Birds:
Extremely toxic to birds.
LD_{50} (Acute oral): 2.5 to 5 mg/kg (Japanese quail).
Fish:
Moderately toxic to fish.
LC_{50} (96 h): 22 to 29 mg/ℓ (Rainbow trout).

Bees:
Toxic to bees – except granular formulations.
Daphnia:
May pose a hazard to *Daphnia magna*.
LC_{50} (48 h): 38.6 µg/ℓ

Degradability:
In soil and water, the product degrades in 30 to 60 days. Degradation takes place primarily through microbial activity, with CO_2 as the principal end product. The degradation process is affected by temperature and soil pH (degradation is accelerated under alkaline conditions). A small degree of hydrolysis may take place in moist soils.
Mobility:
Carbofuran is not resistant to leaching. K_{oc} = 22
Accumulation:
The product is not expected to bio-accumulate.
Log P_{ow} = 1.7.

13. DISPOSAL CONSIDERATION

Pesticide disposal:
Contaminated absorbents, used containers, surplus product, etc., should be burnt at 1000 ^{o}C in an incinerator, preferably designed for pesticide disposal, or buried in designated landfill. Hydrolysis under alkaline conditions (e.g. sodium hydroxide) is a suitable method to dispose of small quantities of the product. After hydrolysis, dilute and dispose of via the sewage system. Comply with local legislation applying to waste disposal.

Package product wastes:
Emptied containers retain vapour and product residues. Observe all labelled safeguards until container is destroyed. Combustible containers should be disposed of in pesticide incinerators. Metal containers must be crushed and transported to a scrap metal facility for disposal or burial in a designated landfill.

14. TRANSPORT INFORMATION

UN NUMBER:	2757
ADR/RID:	
Substance ID no.	2757
Hazard ID no.	66
Label:	6.1
IMDG/IMO:	
Packaging group:	III
Label of class:	6.1 **Marine pollutant**
Shipping name:	Carbamate pesticide, solid, toxic (**Carbofuran**)
AIR/IATA:	
Shipping name	Carbamate pesticide, solid, toxic (**Carbofuran**)
Class	6.1
Hazard Label	Toxic
Packaging Group	III
Passenger Aircraft	613 (max 25 kg) Y613 (max 1 kg)
Cargo Aircraft	615 (max 100 kg)

15. REGULATORY INFORMATION

Symbol: T +
Indication of danger: Very toxic.
Risk phrases:

R26/28	Very toxic by inhalation and if swallowed.
R50	Very toxic to aquatic organisms.

Safety phrases:

S 1/2	Keep locked up and out of reach children.
S 13	Keep away from food, drink and animal feeding stuffs.
S 20/21	When using do not eat, drink or smoke.
S 22	Do not breathe dust.
S 24/25	Avoid contact with skin and eyes.
S 28	After contact with skin, wash immediately with plenty water.
S 36/37/39	Wear suitable protective clothing, gloves and eye/face protection.
S45	In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

National legislation:
In accordance with 91/155/EEC Directive and with French standard T 01-102 and the South African Occupational Health and Safety Act, 1993 (act. No. 85 of 1993)

16. OTHER INFORMATION

Packing and Labelling
Packed in 5, 10, 20, 25, 50 kg aluminium foil lined and plastic bag containers within 3 ply paper box and labelled according to South African regulations and guidelines.

Disclaimer
All information and instructions provided in this Material Safety Data Sheet (MSDS) are based on the current state of scientific and technical knowledge at the date indicated on the present MSDS and are presented in good faith and believed to be correct. This information applies to the PRODUCT AS SUCH. In case of new formulations or mixes, it is necessary to ascertain that a new danger will not appear.
It is the responsibility of persons in receipt of this MSDS to ensure that the information contained herein is properly read and understood by all people who may use, handle, dispose or in any way come in contact with the product. If the recipient subsequently produces formulations(s) containing this product, it is the recipient's sole responsibility to ensure the transfers of all relevant information from this MSDS to their own MSDS.

References

- Applicable to own physical and chemical, toxicity and ecotoxicity research studies.
- *The Pesticide Manual*; Tenth Edition; Editor Clive Tomlin; Crop Protection Publications, 1994.
- *Pestline*; Material Safety Data Sheets for Pesticides and Related Chemicals; Volume II; Occupational Health Services Inc., 1991.
- Florida Agricultural Information Retrieval System: University of Florida.

END OF DOCUMENT
Compiled: October 2001
Reviewed: August 2011

Cerilliant®
Analytical Reference Standards

Safety Data Sheet

Revision Date:12/2/2010

Section I - Identification

Product Identity: p,p'-DDE [4,4'-Dichlorodiphenyldichloroethylene]

Product Number: **ERD-007**

Manufacturer: Cerilliant Corporation
811 Paloma Drive, Suite A
Round Rock, TX 78665

Phone: 512-310-5100
FAX: 512-238-9129
Emergency (ChemTrec) 800-424-9300
703-527-3887

Section II - Hazard Information

Target Organs: N/A

Signal Words: Warning

GHS/CLP Classification:

Acute toxicity, oral-Cat 4

Carcinogen-Cat 2

Aquatic toxicity, acute-Cat 1

Aquatic toxicity, chronic-Cat 4

Hazard Statements:

H302	Harmful if swallowed.
H351	Suspected of causing cancer
H400	Very toxic to aquatic life.
H413	May cause long lasting harmful effects to aquatic life.

Precautionary Statements:

P273	Avoid release to the environment.
P281	Use personal protective equipment as required.

EU Directives Classification:

Symbol of Danger:	**Indication of Danger:**
Xn	Harmful
N	Dangerous to the environment

Risk Phrases:

R22	Harmful if swallowed.
R40	Possible risks of irreversible effects.
R50/53	Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:

S36/37	Wear suitable protective clothing and gloves.
S60	This material and its container must be disposed of as hazardous waste.
S61	Avoid release to the environment. Refer to special instructions/Safety data sheets.

Section III - Composition/Information on Ingredients

Hazardous Components	CAS Number	Molecular Formula	Molecular Weight	EC Number	CLP Index Number	%
p,p'-DDE	72-55-9	C14H8Cl4	318.03	N/A	N/A	100

Section IV - First Aid Measures

Eye Contact: Flush eyes with copious amounts of water for a minimum of 15 minutes and consult a physician.

Ingestion: Do not induce vomiting. Rinse mouth with water and consult a physician.

Skin Contact: Wash affected areas with copious amounts of water and consult a physician.

Inhalation: Remove to fresh air. If breathing is disturbed, give artificial respiration while transporting to a medical facility.

Section V - Fire Fighting Measures

Flash point: N/A

Flammable Limits:

Method Used: N/A

LEL: N/A **UEL:** N/A

Autoignition Temperature: N/A

Extinguishing Media: Water spray, chemical, or carbon dioxide extinguisher.

Special Fire Fighting Procedures: Wear SCBA and protective clothing to prevent contact with skin and eyes.

Unusual Fire and Explosion Hazards: N/A

Section VI - Accidental Release Measures

Evacuate area. Remove all sources of ignition. Use inert absorbent to pick up all spilled material. Transfer to a suitable waste container with non-sparking tools. Wash spill site with appropriate cleaning agents to remove residual traces of spilled material.

Section VII - Handling and Storage

Handling: Do not breathe dust or vapor. Avoid contact with eyes, skin, and clothing. Avoid prolonged, repeated exposure. Wash thoroughly after handling.

Storage: Room Temperature. Protect from light. Keep container closed. Keep away from ignition sources.

Section VIII - Exposure Controls/Personal Protection

As appropriate to quantity handled.

Ventilation-Local Exhaust: Use with forced ventilation.

General Mechanical: Normal laboratory air exchange.

Respiratory Protection: NIOSH approved cartridge type respirator with organic vapor cartridge with HEPA pre-filter recommended.

Eye Protection: Safety glasses with side shields or chemical safety goggles.

Protective Gloves: Compatible chemical resistant gloves.

Other Protective Clothing or Equipment: Lab Coat

Work/Hygienic Practices: Only experienced personnel should be allowed to handle this material.

Exposure Limits				
	OSHA PEL	**ACGIH TLV**	**DFG MAK**	**Other Limits**
p,p'-DDE	N/A	N/A	N/A	N/A

Section IX- Physical and Chemical Properties

Boiling Point (°C): 336

Melting Point (°C): 89

Specific Gravity (Water =1): N/A

Vapor Pressure (mm Hg): 6.0E-06 @ 25 °C

Vapor Density (Air =1): N/A

Evaporation Rate (Butyl Acetate =1): N/A

Solubility in Water: 0.04 mg/L @ 25 °C

Appearance and Odor: Solid

Section X- Stability and Reactivity

Stability: Stable

Conditions to Avoid: N/A

Incompatible Materials: Strong oxidizing agents, strong bases

Hazardous Decomposition Products: carbon monoxide, carbon dioxide and chlorine

Section XI- Toxicological Information

Routes of Entry: Inhalation: Yes Ingestion: Yes Skin: Yes

Carcinogenicity:
IARC: N/A
NTP: N/A
OSHA: N/A

Symptoms of Exposure: N/A

Toxicity Data:

oral-rat LD50: 880 mg/kg
oral-mouse LD50: 700 mg/kg

The toxicological properties of p,p'-DDE [4,4'-Dichlorodiphenyldichloroethylene] have not been fully investigated. It should be assumed to have toxic effects and, therefore, procedures appropriate for the safe handling of hazardous chemicals should be followed.

Section XII- Ecological Information

Fish: Lepomis macrochirus (Bluegill) LC50: 0.2 - 0.3 mg/L/96H
Fish: Oncorhynchus mykiss (rainbow trout) LC50: 0.03 - 0.04 mg/L/96H
Fish: Salmo salar (Atlantic salmon) LC50: 0.05 - 0.18 mg/L/96H

Section XIII- Disposal Considerations

Waste materials should be disposed of under conditions that meet Federal, State, and Local environmental control regulations. Contact a licensed waste disposal specialist to dispose of this material.

Section XIV- Transport Information

DOT		**IATA**	
Proper Shipping Name:	Environmentally hazardous substances, solid, n.o.s.	Proper Shipping Name:	Environmentally hazardous substance, solid, n.o.s.
UN Number:	3077	UN Number:	3077
Class:	9	Class:	9
Packing Group:	III	Packing Group:	III
PIH:	N	PIH:	N
Small quantities exempted		Small quantities exempted	

Section XV- Regulatory Information

SARA 302: No
SARA 313: No
CERCLA RQ (pounds): 1

Section XVI- Other Information

The information contained herein is believed to be accurate and is supplied in good faith. Cerilliant Corporation makes no warranty with respect to and assumes no legal responsibility for use or reliance upon this information. Individuals receiving this data must exercise their own judgement in determining its suitability for a particular purpose.

MATERIAL SAFETY DATA SHEET

1. SUBSTANCE AND SOURCE IDENTIFICATION

National Institute of Standards and Technology
Standard Reference Materials Program
100 Bureau Drive, Stop 2300
Gaithersburg, Maryland 20899-2300

RM Number: 8469
MSDS Number: 8469
RM Name: 4,4'-DDT

Date of Issue: 16 December 2011

Telephone: 301-975-2200
FAX: 301-926-4751
E-mail: SRMMSDS@nist.gov

Emergency Telephone ChemTrec:
1-800-424-9300 (North America)
+1-703-527-3887 (International)

Description: This Reference Material (RM) is provided as a primary reference compound of measured purity for 4,4-DDT (dichlorodiphenyltrichloroethane). It is intended for use in the evaluation of procedures and daily working standards used in the measurement of 4,4-DDT in environmental samples. A unit of RM 8469 consists of one vial containing approximately 100 mg of 4,4-DDT.

Substance: dichlorodiphenyltrichloroethane

Other Designation: 4,4'-DDT; DDT; p'p'-DDT; 1,1'-(2,2,2-trichlroroethylidene)bis(4-chlorobenzene); 1,1,1-trichloro-2,2-bis(p-chlorophenyl)ethane; alpha,alpha-bis(p-chlorophenyl)-beta,beta,beta-trichloroethane; dicophane; pentachlorin; RCRA U061; $C_{14}H_9Cl_5$.

2. HAZARDS IDENTIFICATION

NFPA Ratings (Scale 0–4): Health = 2 Fire = 1 Reactivity = 0

Major Health Hazards: Harmful on contact with skin, harmful if swallowed, suspect cancer hazard (in animals).

Physical Hazards: Slight fire hazard.

Potential Health Effects

Ingestion: Acute: nausea, vomiting, diarrhea, stomach pain, headache, dizziness, visual disturbances, tingling sensation, lung congestion, blood disorders, paralysis, convulsions, and coma. Chronic: same as other routes of exposure. In addition, it may cross the placenta and may be excreted in breast milk.

Inhalation: Acute and chronic: same as short-term ingestion if prolonged and repeated exposure.

Skin Contact: Acute and chronic: same as short-term ingestion if prolonged and repeated exposure.

Eye Contact: Acute and chronic: no information available.

Listed as a Carcinogen/Potential Carcinogen

	Yes	No
In the National Toxicology Program Report on Carcinogens	X[(a)]	
In the International Agency for Research on Cancer Monographs	X[(b)]	
By The Occupational Safety and Health Administration (OSHA)		X

[(a)] NTP – Reasonably anticipated to be a human carcinogen.

[(b)] IARC – Group 2B (possibly carcinogenic).

3. COMPOSITION AND INFORMATION ON HAZARDOUS INGREDIENTS

Component	CAS Number	EC Number (EINECS)	Nominal Concentration (%)
4,4'-DDT	50-29-3	200-024-3	100

EC Classification: T (Cancer Carc. 3), N
EC Risk (R No.): 25, 40, 48/25, 50/53
EC Safety (S No.): 22, 36/37, 45, 60, 61
EC Risk/Safety Phrases: See Section 15, "Regulatory Information".

4. First Aid Measures

Inhalation: If adverse effects occur, remove to uncontaminated area. If not breathing, give artificial respiration by qualified personnel. Seek immediate medical attention.

Skin Contact: Rinse affected area with soap and water for at least 15 minutes. Seek medical assistance if necessary.

Eye Contact: Immediately flush eyes, including under the eyelids, with copious amounts of water for at least 15 minutes. Seek immediate medical attention.

Ingestion: Contact local poison control immediately; if vomiting occurs, keep head lower than hips to prevent aspiration. If unconscious, turn head to side; get medical attention immediately.

5. Fire Fighting Measures

Fire and Explosion Hazards: Slight fire hazard.

Extinguishing Media: Regular dry chemical, carbon dioxide, fine water spray, regular foam.

Fire Fighting: Avoid inhalation of combustion by-products.

Flash Point (°C): Not available.
Method Used: Not applicable.

Autoignition Temp. (°C): Not available.

Flammability Limits in Air

UPPER (Volume %): Not available.
LOWER (Volume %): Not available.

Products of Combustion: Thermal decomposition may release hazardous or toxic gases (see Section 10, "Stability and Reactivity").

6. Accidental Release Measures

Occupational Release: Absorb with sand or other non-combustible material and collect in appropriate container for proper disposal.

Disposal: Refer to Section 13, "Disposal Considerations".

7. Handling and Storage

Storage: Store and handle in accordance with all current regulations and standards. Subject to storage regulations: US OSHA 29 CFR 1910.106. Keep separated from incompatible substances.

Safe Handling Precautions: See Section 8, "Exposure Controls and Personal Protection".

8. Exposure Controls and Personal Protection

Exposure Limits:

OSHA (TWA):	1 mg/m^3	Prevent or reduce skin absorption.
NIOSH (TWA):	0.5 mg/m^3	
NIOSH (IDLH):	500 mg/m^3	
ACGIH (TWA):	1 mg/m^3	

Ventilation: Local exhaust ventilation system.

Respirator: If workplace conditions warrant a respirator, a respiratory protection program that meets OSHA 29 CFR 1910.134 must be followed. Refer to NIOSH 42 CFR 84 for applicable certified respirators.

Eye Protection: Wear safety goggles. An eyewash station and drench shower should be readily available near the handling and use areas.

Personal Protection: Chemically resistant gloves and clothing are recommended.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance and Odor: White crystals; slight odor.

Molar Mass: 354.49 g/mol

Molecular Formula: $C_{14}H_9Cl_5$.

Specific Gravity (water = 1): 1.56 at 15 °C

Melting Point (°C): 107 to 109

Boiling Point (°C): 260

Water Solubility: Insoluble.

10. STABILITY AND REACTIVITY

Stability: X Stable ____ Unstable

Stable at normal temperature and pressure.

Conditions to Avoid: Avoid heat, flames, sparks, and other ignition sources. Avoid generating dust. Keep out of water supplies and sewers.

Incompatible Materials: Bases, metals, and combustible materials.

Fire/Explosion Information: See Section 5, "Fire Fighting Measures".

Hazardous Decomposition: Halogenated compounds, and oxides of carbon.

Hazardous Polymerization: ____ Will Occur X Will Not Occur

11. TOXICOLOGICAL INFORMATION

Route of Entry: X Inhalation X Skin X Ingestion

Toxicity Data

Rabbit, Dermal LD_{50}: 300 mg/kg
Rat, Oral LD_{50}: 87 mg/kg.
Rat, Oral LD_{50}: 350 mg/kg.

Health Effects: See Section 2, "Hazards Identification" for potential health effects.

Target Organs: Central nervous system.

Mutagen/Teratogen

The following endpoints are listed in the Registry of Toxic Effects of Chemical Substances (RTECS).

Tumorigenic effects: Rat, Oral TD: 438 mg/kg (2 year).
Mutagenic effects: Human, 200 µg/L (72 h).
Reproductive effects: Rat, Oral, TDLo: 430 mg/kg (pregnant 1 d to 21 d and post 21 d).

Medical Conditions Generally Aggravated by Exposure: Blood system disorders, kidney disorders, and liver disorders.

12. ECOLOGICAL INFORMATION

Ecotoxicity Data (Aquatic Toxicity)

Fish: rainbow trout (*Oncorhynchus mykiss*), LC_{50}: 1.25 µg/L to 3.59 µg/L (96 h), static.
Invertebrate: freshwater water flea (*daphnia magna*), LC_{50}: 0.000 46 mg/L to 0.001 mg/L (48 h), static

13. DISPOSAL CONSIDERATIONS

Waste Disposal: Dispose in accordance with federal, state, and local regulations.

14. TRANSPORTATION INFORMATION

U.S. DOT and IATA: Organochlorine pesticide, solid, n.o.s. (4,4'-DDT); Hazard class 6.1, UN2761, packing group II.

15. REGULATORY INFORMATION

U.S. REGULATIONS

CERCLA Sections 102a/103 (40 CFR 302.4): 1 lb (0.454 kg) final RQ.
SARA Title III Section 302 (40 CFR 355.30): Not regulated.
SARA Title III Section 304 (40 CFR 355.40): Not regulated.
SARA Title III Section 313 (40 CFR 372.65): Not regulated.
OSHA Process Safety (29 CFR 1910.119): Not regulated.
SARA Title III Sections 311/312 HAZARDOUS CATEGORIES (40 CFR 370.21):

ACUTE HEALTH:	Yes
CHRONIC HEALTH:	Yes
FIRE:	No
REACTIVE:	No
PRESSURE:	No

STATE REGULATIONS

California Proposition 65: Keep out of water supplies and sewers.

Warning this product contains a chemical known to the state of California to cause cancer.

Warning this product contains a chemical known to the state of California to cause reproductive/developmental effects.

CANADIAN REGULATIONS

WHMIS Information: Not provided for this information.

EUROPEAN REGULATIONS

EC Classification:

T – Toxic, Carc. Cat. 3
N – Dangerous to the Environment

EC Risk (R No.):

R25 – Toxic if swallowed.
R40 – Limited evidence of a carcinogenic effect.
R48/25 – Toxic: danger of serious damage to health by prolonged exposure if swallowed.
R50/53 – Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

EC Safety (S No.):

S22 – Do not breathe dust.
S36/37 – Wear suitable protective clothing and gloves.
S45 – In case of accident or if you feel unwell seek medical advice immediately (show the label where possible).
S60 – This material and its container must be disposed of as hazardous waste.
S61 – Avoid release to the environment. Refer to special instructions/safety data sheet.

NATIONAL INVENTORY STATUS

U.S. Inventory (TSCA): 4,4'-DDT is listed.

TSCA 12(b), Export Notification: Section 5, 0.1 de minims concentration.

16. OTHER INFORMATION

Sources: ChemAdvisor, Inc., MSDS, *Dichlorodiphenyltrichloroethane*, 16 September 2011.

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MSDS Name: Methyl 2-(7-hydroxybenzofuran-3-yl)acetate
CAS Number: 181052-63-1
Catalog Numbers: AX8235314
For R&D use only.

Company Identification:

1408 E. Arrow Highway
Irwindale, CA91706, USA
Phone: (626)461-2812/(626)566-0337
Fax: (626)228-3544

2. COMPOSITION, INFORMATION ON INGREDIENTS

Molecular Formula: C11H10O4
Molecular Weight: 206.195g/mol

Component		Concentration
Methyl 2-(7-hydroxybenzofuran-3-yl)acetate		
CAS Number	181052-63-1	-

3. HAZARDS IDENTIFICATIONEMERGENCY OVERVIEW

3.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008 [EU-GHS/CLP]

Acute toxicity, Oral (Category 4)

Skin irritation (Category 2)

Eye irritation (Category 2)

Specific target organ toxicity - single exposure (Category 3)

Classification according to EU Directives 67/548/EEC or 1999/45/EC

Harmful if swallowed. Irritating to eyes, respiratory system and skin.

3.2 Label elements

Labelling according Regulation (EC) No 1272/2008 [CLP]

Pictogram	
Signal word	Warning
Hazard statement(s)	
H302	Harmful if swallowed.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.
Precautionary statement(s)	
P261	Avoid breathing dust.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and

	easy to do. Continue rinsing.
Supplemental Hazard Statements	None

According to European Directive 67/548/EEC as amended

Hazard symbol(s)

R-phrase(s)	
R22	Harmful if swallowed.
R36/37/38	Irritating to eyes, respiratory system and skin.
S-phrase(s)	
S26	In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S36/37	Wear suitable protective clothing and gloves.
3.3 Other hazards	None

4. FIRST AID MEASURES

Eyes: Flush eyes with plenty of water occasionally lifting the upper and lower lids. Get medical aid.

Skin: Get medical aid. Flush skin with plenty of water while removing contaminated clothing and shoes.

Ingestion: Get medical aid. Wash mouth out with water.

Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

5. FIRE FIGHTING MEASURES

General Information: As in any fire, wear a self-contained breathing apparatus and full protective gear.

Extinguishing Media: Use water spray, dry chemical, carbon dioxide or chemical foam.

6. ACCIDENTAL RELEASE MEASURES

General Information: Use proper personal protective equipment.

Spills/Leaks: Vacuum or sweep up material and place into suitable disposalcontainer. Avoid generating dusty conditions.

7. HANDLING AND STORAGE

Handling: Avoid breathing dust, vapor, mist or gas. Avoid contact with eyes, skin.

Storage: Storage: Keep container tightly closed. Store in a cool, dark and well-ventilated place.

Store away from incompatible materials such as oxidizing agents.

Recommended storage temperature: 2 - 4 °C

8. EXPOSURE CONTROLS, PERSONAL PROTECTION

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and safety shower. Use adequate ventilation to keep airborne concentrations low.

Personal Protective Equipment

Eyes: Wear chemical safety goggles.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: Wear appropriate respirators where necessary.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	N/A
Boiling Point	No data available.
Melting Point	No data available.
Flash point	No data available.
Water solubility	Slightly soluble.
Ignition temperature	No data available.
Lower explosion limit	No data available.
Upper explosion limit	No data available.

10. STABILITY AND REACTIVITY

Chemical Stability: This product is relatively unstable under normal temperature.
Incompatibilities with Other Materials: Strong oxidizing agents.
Hazardous combustion or Decomposition products: Carbon monoxide, and carbon dioxide.

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available.

Skin corrosion/irritation
No data available.

Serious eye damage/eye irritation
No data available.

Respiratory or skin sensitization
No data available.

Germ cell mutagenicity
No data available.

Carcinogenicity
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity
No data available.

Specific target organ toxicity - single exposure
No data available.

Specific target organ toxicity - repeated exposure
No data available.

Aspiration hazard
No data available.

Additional Information
RTECS: No data available.
Burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting, To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigate.

12. ECOLOGICAL INFORMATION

12.1 Toxicity
No data available.

12.2 Persistence and degradability

No data available.

12.3 Bioaccumulative potential

No data available.

12.4 Mobility in soil

No data available.

12.5 Results of PBT and vPvB assessment

No data available.

12.6 Other adverse effects

No data available.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product

Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging

Dispose of as unused product.

14. TRANSPORT INFORMATION

14.1 UN number

ADR/RID: _ IMDG: _ IATA: _

14.2 UN proper shipping name

ADR/RID: Not dangerous goods

IMDG: Not dangerous goods

IATA: Not dangerous goods

14.3 Transport hazard class(es)

ADR/RID: _ IMDG: _ IATA: _

14.4 Packaging group

ADR/RID: _ IMDG: _ IATA: _

14.5 Environmental hazards

ADR/RID: No IMDG Marine pollutant: No IATA: No

14.6 Special precautions for user

No data available.

15. REGULATORY INFORMATION

This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

Safety, health and environmental regulations/legislation specific for the substance or mixture:

No data available.

Chemical Safety Assessment: No data available.

16. ADDITIONAL INFORMATION

The above information pertains to this product as currently formulated, and is based on the information available at this time. Addition of reducers or other additives to this product may substantially alter the composition and hazards of the product. Since conditions of use are outside our control, we make no warranties, express or implied, and assume no liability in connection with any use of this information.

SAFETY DATA SHEET

1. Identification

Product identifier **Karbutilate**

Other means of identification

Item N-12945

Synonym(s) Carbamic acid, (1,1-dimethylethyl)-, 3-[[(dimethylamino)carbonyl]amino]phenyl ester

Recommended use Not available.

Recommended restrictions None known.

Manufacturer/Importer/Supplier/Distributor information

Manufacturer

Company name Chem Service, Inc.

Address 660 Tower Lane
West Chester, PA 19380
United States

Telephone Toll Free 800-452-9994
Direct 610-692-3026

Website www.chemservice.com

E-mail info@chemservice.com

Emergency phone number Chemtrec US 800-424-9300
Chemtrec outside US +1 703-527-3887

2. Hazard(s) identification

Physical hazards Not classified.

Health hazards Not classified.

Environmental hazards Not classified.

OSHA defined hazards Not classified.

Label elements

Hazard symbol None.

Signal word None.

Hazard statement The substance does not meet the criteria for classification.

Precautionary statement

Prevention Observe good industrial hygiene practices.

Response Wash hands after handling.

Storage Store away from incompatible materials.

Disposal Dispose of waste and residues in accordance with local authority requirements.

Hazard(s) not otherwise classified (HNOC) None known.

Supplemental information Not applicable.

3. Composition/information on ingredients

Substances

Chemical name	Common name and synonyms	CAS number	%
Karbutilate	Carbamic acid, (1,1-dimethylethyl)-, 3-[[(dimethylamino)carbonyl]amino]phenyl ester	4849-32-5	100

*Designates that a specific chemical identity and/or percentage of composition has been withheld as a trade secret.

4. First-aid measures

Inhalation Move to fresh air. Call a physician if symptoms develop or persist.

Skin contact Wash off with soap and water. Get medical attention if irritation develops and persists.

Eye contact Rinse with water. Get medical attention if irritation develops and persists.

Ingestion Rinse mouth. Get medical attention if symptoms occur.

Most important symptoms/effects, acute and delayed	Direct contact with eyes may cause temporary irritation.
Indication of immediate medical attention and special treatment needed	Treat symptomatically.
General information	Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

5. Fire-fighting measures

Suitable extinguishing media	Water fog. Foam. Dry chemical powder. Carbon dioxide (CO2).
Unsuitable extinguishing media	Do not use water jet as an extinguisher, as this will spread the fire.
Specific hazards arising from the chemical	During fire, gases hazardous to health may be formed.
Special protective equipment and precautions for firefighters	Self-contained breathing apparatus and full protective clothing must be worn in case of fire.
Fire-fighting equipment/instructions	Use water spray to cool unopened containers.
Specific methods	Use standard firefighting procedures and consider the hazards of other involved materials.
General fire hazards	No unusual fire or explosion hazards noted.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	Keep unnecessary personnel away. For personal protection, see section 8 of the SDS.
Methods and materials for containment and cleaning up	Stop the flow of material, if this is without risk. Following product recovery, flush area with water. For waste disposal, see section 13 of the SDS.
Environmental precautions	Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling	Observe good industrial hygiene practices.
Conditions for safe storage, including any incompatibilities	Store in original tightly closed container. Store away from incompatible materials (see Section 10 of the SDS).

8. Exposure controls/personal protection

Occupational exposure limits	No exposure limits noted for ingredient(s).
Biological limit values	No biological exposure limits noted for the ingredient(s).
Appropriate engineering controls	Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

Individual protection measures, such as personal protective equipment

Eye/face protection	If contact is likely, safety glasses with side shields are recommended.
Skin protection	
Hand protection	For prolonged or repeated skin contact use suitable protective gloves.
Other	Wear suitable protective clothing.
Respiratory protection	In case of insufficient ventilation, wear suitable respiratory equipment.
Thermal hazards	Wear appropriate thermal protective clothing, when necessary.
General hygiene considerations	Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical and chemical properties

Appearance	
Physical state	Solid.
Form	Solid.
Color	Not available.
Odor	Not available.
Odor threshold	Not available.
pH	Not available.

Melting point/freezing point	Not available.
Initial boiling point and boiling range	Not available.
Flash point	Not available.
Evaporation rate	Not available.
Flammability (solid, gas)	Not available.
Upper/lower flammability or explosive limits	
Flammability limit - lower (%)	Not available.
Flammability limit - upper (%)	Not available.
Explosive limit - lower (%)	Not available.
Explosive limit - upper (%)	Not available.
Vapor pressure	< 0 kPa at 25 °C
Vapor density	Not available.
Relative density	Not available.
Solubility(ies)	
Solubility (water)	Not available.
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Viscosity	Not available.
Other information	
Molecular formula	C14H21N3O3

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
Chemical stability	Material is stable under normal conditions.
Possibility of hazardous reactions	No dangerous reaction known under conditions of normal use.
Conditions to avoid	Contact with incompatible materials.
Incompatible materials	Strong oxidizing agents.
Hazardous decomposition products	No hazardous decomposition products are known.

11. Toxicological information

Information on likely routes of exposure

Ingestion	Expected to be a low ingestion hazard.
Inhalation	No adverse effects due to inhalation are expected.
Skin contact	No adverse effects due to skin contact are expected.
Eye contact	Direct contact with eyes may cause temporary irritation.
Symptoms related to the physical, chemical and toxicological characteristics	Direct contact with eyes may cause temporary irritation.

Information on toxicological effects

Acute toxicity	Not available.
Skin corrosion/irritation	Prolonged skin contact may cause temporary irritation.
Serious eye damage/eye irritation	Direct contact with eyes may cause temporary irritation.
Respiratory or skin sensitization	
Respiratory sensitization	Not available.
Skin sensitization	This product is not expected to cause skin sensitization.
Germ cell mutagenicity	No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.
Carcinogenicity	This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

Reproductive toxicity	This product is not expected to cause reproductive or developmental effects.
Specific target organ toxicity - single exposure	Not classified.
Specific target organ toxicity - repeated exposure	Not classified.
Aspiration hazard	Not available.

12. Ecological information

Ecotoxicity	The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.
Persistence and degradability	No data is available on the degradability of this product.
Bioaccumulative potential	No data available.
Mobility in soil	No data available.
Other adverse effects	No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

13. Disposal considerations

Disposal instructions	Collect and reclaim or dispose in sealed containers at licensed waste disposal site.
Local disposal regulations	Dispose in accordance with all applicable regulations.
Hazardous waste code	The waste code should be assigned in discussion between the user, the producer and the waste disposal company.
Waste from residues / unused products	Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).
Contaminated packaging	Empty containers should be taken to an approved waste handling site for recycling or disposal. Since emptied containers may retain product residue, follow label warnings even after container is emptied.

14. Transport information

DOT

Not regulated as dangerous goods.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code	Not applicable.

15. Regulatory information

US federal regulations One or more components are not listed on TSCA.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

CERCLA Hazardous Substance List (40 CFR 302.4)

Not listed.

SARA 304 Emergency release notification

Not regulated.

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories	Immediate Hazard - No Delayed Hazard - No Fire Hazard - No Pressure Hazard - No Reactivity Hazard - No

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical	No

SARA 313 (TRI reporting)

Not regulated.

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA) Not regulated.

US state regulations

US. Massachusetts RTK - Substance List

Not regulated.

US. New Jersey Worker and Community Right-to-Know Act

Not regulated.

US. Pennsylvania RTK - Hazardous Substances

Not regulated.

US. Rhode Island RTK

Not regulated.

US. California Proposition 65

California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins.

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	No
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	No
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	No
New Zealand	New Zealand Inventory	No
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	No
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	No

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

Issue date 01-27-2014

Version # 01

NFPA ratings Health: 0
Flammability: 0
Instability: 0

Disclaimer

The above information is believed to be correct on the date it was last revised and must not be considered all inclusive. The information has been obtained only by a search of available literature and is only a guide for handling the chemicals. OSHA regulations require that if other hazards become evident, an upgraded SDS must be made available to the employee within three months. RESPONSIBILITY for updates lies with the employer and not with CHEM SERVICE, Inc.

Persons not specifically and properly trained should not handle this chemical or its container. This product is furnished FOR LABORATORY USE ONLY! Our products may NOT BE USED as drugs, cosmetics, agricultural or pesticide products, food additives or as household chemicals.

This Safety Data Sheet (SDS) is intended only for use with Chem Service, Inc. products and should not be relied on for use with materials from any other supplier even if the chemical name(s) on the product are identical! Whenever using an SDS for a solution or mixture the user should refer to the SDS for every component of the solution or mixture. Chem Service warrants that this SDS is based upon the most current information available to Chem Service at the time it was last revised. THIS WARRANTY IS EXCLUSIVE, AND CHEM SERVICE, INC. MAKES NO OTHER WARRANTY, EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE. This SDS is provided gratis and CHEM SERVICE, INC. SHALL NOT BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL OR CONTINGENT DAMAGES.

This product is furnished FOR LABORATORY USE ONLY.

SAFETY DATA SHEET

Version 5.6
Revision Date 11/24/2014
Print Date 04/17/2015

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Dichloromethane

Product Number : 270997
Brand : Sigma-Aldrich
Index-No. : 602-004-00-3

CAS-No. : 75-09-2

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Skin irritation (Category 2), H315
Eye irritation (Category 2A), H319
Carcinogenicity (Category 2), H351
Specific target organ toxicity - single exposure (Category 3), Respiratory system, Central nervous system, H335, H336
Specific target organ toxicity - repeated exposure, Oral (Category 2), Liver, Blood, H373
Specific target organ toxicity - repeated exposure, Inhalation (Category 2), Central nervous system, H373

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word Warning

Hazard statement(s)

H315	Causes skin irritation.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.
H336	May cause drowsiness or dizziness.
H351	Suspected of causing cancer.
H373	May cause damage to organs (Liver, Blood) through prolonged or repeated exposure if swallowed.
H373	May cause damage to organs (Central nervous system) through prolonged or repeated exposure if inhaled.

Precautionary statement(s)

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear eye protection/ face protection.
P280	Wear protective gloves.
P281	Use personal protective equipment as required.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P304 + P340 + P312	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/ physician if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms	:	Methylene chloride DCM
Formula	:	CH_2Cl_2
Molecular weight	:	84.93 g/mol
CAS-No.	:	75-09-2
EC-No.	:	200-838-9
Index-No.	:	602-004-00-3
Registration number	:	01-2119480404-41-XXXX

Hazardous components

Component	Classification	Concentration
Methylene chloride		
	Skin Irrit. 2; Eye Irrit. 2A; Carc. 2; STOT SE 3; STOT RE 2; H315, H319, H335, H336, H351, H373, H373	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Move out of dangerous area.Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Heat sensitive. Store under inert gas.
Storage class (TRGS 510): Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
	Remarks	Potential Occupational Carcinogen See Appendix A		

Methylene chloride	75-09-2	TWA	50.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Carboxyhemoglobinemia Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed animal carcinogen with unknown relevance to humans		
		TWA	50 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Carboxyhemoglobinemia Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed animal carcinogen with unknown relevance to humans		
		Substance listed; for more information see OSHA document 1910.1052		
		Substance listed; for more information see OSHA document 1910.1052		
		See Table Z-2		
		PEL	25.000000 ppm	OSHA Specifically Regulated Chemicals/Carcinogens
		1910.1052 This section applies to all occupational exposures to methylene chloride (MC), Chemical Abstracts Service Registry Number 75-09-2, in general industry, construction and shipyard employment. Methylene chloride (MC) means an organic compound with chemical formula, CH2Cl2. Its Chemical Abstracts Service Registry Number is 75-09-2. Its molecular weight is 84.9 g/mole OSHA specifically regulated carcinogen		
		STEL	125.000000 ppm	OSHA Specifically Regulated Chemicals/Carcinogens
		1910.1052 This section applies to all occupational exposures to methylene chloride (MC), Chemical Abstracts Service Registry Number 75-09-2, in general industry, construction and shipyard employment. Methylene chloride (MC) means an organic compound with chemical formula, CH2Cl2. Its Chemical Abstracts Service Registry Number is 75-09-2. Its molecular weight is 84.9 g/mole OSHA specifically regulated carcinogen		

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Methylene chloride	75-09-2	Dichloromethane	0.3000 mg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift (As soon as possible after exposure ceases)			

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Splash contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 148 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid Colour: colourless
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -97 °C (-143 °F)
f)	Initial boiling point and boiling range	39.8 - 40 °C (103.6 - 104 °F)
g)	Flash point	No data available
h)	Evaporation rate	0.71
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 19 %(V) Lower explosion limit: 12 %(V)
k)	Vapour pressure	470.9 hPa (353.2 mmHg) at 20.0 °C (68.0 °F)
l)	Vapour density	2.93 - (Air = 1.0)
m)	Relative density	1.325 g/mL at 25 °C (77 °F)
n)	Water solubility	slightly soluble
o)	Partition coefficient: n-octanol/water	log Pow: 1.25

p)	Auto-ignition temperature	556.1 °C (1,033.0 °F) 662.0 °C (1,223.6 °F)
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

Relative vapour density 2.93 - (Air = 1.0)

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.
Contains the following stabiliser(s):
2-Methyl-2-butene (>0.005 - <0.015 %)

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Heat, flames and sparks. Exposure to sunlight.

10.5 Incompatible materials
Alkali metals, Aluminum, Strong oxidizing agents, Bases, Amines, Magnesium, Strong acids and strong bases, Vinyl compounds

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - > 2,000 mg/kg

LC50 Inhalation - Rat - 52,000 mg/m3

LD50 Dermal - Rat - > 2,000 mg/kg
(OECD Test Guideline 402)

No data available

Skin corrosion/irritation
Skin - Rabbit
Result: Irritating to skin. - 24 h
(Draize Test)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Irritating to eyes. - 24 h
(Draize Test)

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity

Rat
DNA damage

Carcinogenicity

Carcinogenicity - Rat - Inhalation
Tumorigenic:Carcinogenic by RTECS criteria. Endocrine:Tumors.

Limited evidence of carcinogenicity in animal studies

Suspected human carcinogens

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Methylene chloride)

NTP: Reasonably anticipated to be a human carcinogen (Methylene chloride)

OSHA: OSHA specifically regulated carcinogen (Methylene chloride)

Reproductive toxicity

No data available

Specific target organ toxicity - single exposure
May cause respiratory irritation.
May cause drowsiness or dizziness.

Specific target organ toxicity - repeated exposure
Inhalation - May cause damage to organs through prolonged or repeated exposure. - Central nervous system
Oral - May cause damage to organs through prolonged or repeated exposure. - Liver, Blood

Aspiration hazard
No data available

Additional Information
RTECS: PA8050000

Dichloromethane is metabolized in the body producing carbon monoxide which increases and sustains carboxyhemoglobin levels in the blood, reducing the oxygen-carrying capacity of the blood., Acts as a simple asphyxiant by displacing air., anesthetic effects, Difficulty in breathing, Headache, Dizziness, Prolonged or repeated contact with skin may cause:, defatting, Dermatitis, Contact with eyes can cause:, Redness, Blurred vision, Provokes tears., Effects due to ingestion may include:, Gastrointestinal discomfort, Central nervous system depression, Paresthesia., Drowsiness, Convulsions, Conjunctivitis., Pulmonary edema. Effects may be delayed., Irregular breathing., Stomach/intestinal disorders, Nausea, Vomiting, Increased liver enzymes., Weakness, Heavy or prolonged skin exposure may result in the absorption of harmful amounts of material., Abdominal pain

Stomach - Irregularities - Based on Human Evidence
Stomach - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Pimephales promelas (fathead minnow) - 193.00 mg/l - 96 h
	NOEC - Cyprinodon variegatus (sheepshead minnow) - 130 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 1,682.00 mg/l - 48 h

12.2 Persistence and degradability

Biodegradability	Result: < 26 % - Not readily biodegradable. (OECD Test Guideline 301C)

12.3 Bioaccumulative potential
Does not bioaccumulate.

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber. Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1593 Class: 6.1 Packing group: III
Proper shipping name: Dichloromethane
Reportable Quantity (RQ): 1000 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 1593 Class: 6.1 Packing group: III EMS-No: F-A, S-A
Proper shipping name: DICHLOROMETHANE

IATA
UN number: 1593 Class: 6.1 Packing group: III
Proper shipping name: Dichloromethane

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Methylene chloride	75-09-2	2007-07-01

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Methylene chloride	75-09-2	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Methylene chloride	75-09-2	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Methylene chloride	75-09-2	2007-07-01

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.	CAS-No.	Revision Date
Methylene chloride	75-09-2	2007-09-28

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Carc.	Carcinogenicity
Eye Irrit.	Eye irritation
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.
H336	May cause drowsiness or dizziness.
H351	Suspected of causing cancer.
H373	May cause damage to organs through prolonged or repeated exposure if swallowed.
Skin Irrit.	Skin irritation
STOT RE	Specific target organ toxicity - repeated exposure
STOT SE	Specific target organ toxicity - single exposure

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	0
Reactivity Hazard:	0

Further information

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.6 Revision Date: 11/24/2014 Print Date: 04/17/2015

APPENDIX C
COMMUNITY AIR MONITORING PLAN

PARSONS

INTRODUCTION

This appendix describes the community air monitoring requirements to be performed during ground invasive activities at the FMC Corporation's Middleport, New York plant Site (Facility or Site). The Community Air Monitoring Plan (CAMP) will be performed in addition to worker breathing zone air monitoring required in the HASP.

The CAMP requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when ground intrusive activities are in progress at the Facility or work zone. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-Site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/ or work shutdown. Additionally, the CAMP helps to confirm that work activities do not spread contamination off-Site through the air.

PURPOSE

This CAMP is a companion document to the Health and Safety Plan (HASP). The HASP will be directed primarily toward protection of workers within the exclusion zone. The CAMP provides protection for the downwind community.

The purpose of this CAMP is to provide real-time monitoring for airborne VOCs and particulates at the downwind perimeter of the work area during investigation and remediation activities to be conducted at the Site. In addition, the CAMP establishes response and action levels for airborne emissions that may trigger emission control actions.

SCOPE

The chemicals of potential concern at the Site are as described in the HASP. Chemicals of potential concern in the off-Site study areas are predominantly arsenic, and to a lesser degree, lead and chlorinated pesticides.

When working on contaminated areas of the FMC plant Site, monitoring for VOCs and particulates will be performed during ground invasive activities. Arsenic, lead and chlorinated pesticides are non-volatile and any airborne emissions would be associated with particulates.

VOCs will be monitored using a photoionization detector with an appropriate electrodeless ultraviolet discharge lamp or other equivalent instrument. Particulates will be monitored using a Particulate Air Monitor equipped with a micro-processor to measure and record real-time recordings of airborne particulate concentration in milligrams per cubic meter (mg/m^3).

During ground intrusive activities, air monitoring will be conducted continuously at the perimeter of the work area. Ground intrusive activities include soil/ sediment excavation handling, soil borings and groundwater monitoring well installations. During sampling activities, periodic air monitoring will be conducted. Sampling activities to be conducted will include collection of groundwater, soil, sediment and water samples. Periodic monitoring during sample collection will at a minimum consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/ purging, and taking a reading prior to leaving a sample location. Specific monitoring requirements are described below.

AIR QUALITY MONITORING

Air quality monitoring will be performed for organic vapors and airborne particulates at one upwind and two downwind locations within and around each separate work area during soil excavation, soil removal, soil placement, grading and compaction activities, and any other activity that may potentially create an airborne hazard. Other monitoring locations will be added to ensure that the following locations are monitored at all times during excavation activities regardless of indicated wind direction

- At the perimeter of a remediation area between each work are and public street; and
- At the perimeter of a remediation area between each work area and each adjacent occupied residential property.

VOC Monitoring, Response Levels and Actions

VOCs must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions. A wind sock will determine the upwind and downwind locations for air monitoring activities. Monitoring instrumentation will be as described above. The monitoring instruments will be calibrated at least daily. The equipment should be capable of calculating I5-minute running average concentrations, which will be compared to the levels specified below.

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work are or exclusion zone exceeds 5 parts per million (ppm) above background for 15-minute average, work activities will be temporarily halted and monitoring continued. If the total organic vapor level decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.
- If total organic vapor levels at the downwind perimeter of the work area of exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential commercial structure (whichever is less, but in no case less than 20 feet) is below 5 ppm over background for the I5-minute average.
- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shut down.

All 15-minute readings must be recorded and be available for the agencies' field representative(s) to review. Any instantaneous readings used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels and Actions

Particulate concentrations will be monitored continuously during ground intrusive activities at the downwind perimeter of the exclusion zone. The particulate monitoring will be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-l0) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an

audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

- If the downwind PM-l0 particulate level is 100 micrograms per cubic meter (µg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-l0 particulate levels do not exceed 150 µg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.
- If, after implementation of dust suppression techniques, downwind PM-l0 particulate levels are greater than 150 µg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-l0 particulate concentration to within 150 µg/m^3 of the upwind level and in preventing visible dust migration.

All readings must be recorded and be available for the agencies' field representative(s) to review.

A fugitive dust suppression system will be in place and employed whenever ground invasive and soil handling activities may potentially create an airborne hazard at remediation work areas. General dust suppression techniques may include applying water on haul roads, wetting equipment and excavation faces, spraying water on buckets during excavation and dumping, restricting vehicle speed and immediately covering or wetting excavation areas and contaminated soil placed in the ESI upon completion. In addition, to continuous monitoring, a common sense approach will be employed to address fugitive dust (i.e., if dust is visually observed to be leaving the work area and is not detected by the monitors, dust suppression techniques will be applied.

Additional guidance on fugitive dust suppression and particulate air monitoring requirements are specified in the NYSDEC's Technical and Administrative Guidance Memorandum #4031 - Fugitive Dust Suppression and Particulate Monitoring Program at Inactive Hazardous Waste Sites, dated October 27, 1989.

ATTACHMENT 1
KEY PROJECT PERSONNEL CONTACT LIST

PARSONS

Attachment 1
Project Key Personnel
Contact List

Updated 5/15/2015

Facility Name:	FMC Agricultural Solutions	
Facilty Address: City/State/Province	100 Niagara St. Middleport, NY 14105	
Main Telephone	Fax	
(716) 735-6300		
Facility Manager		Contact Information
Name: Greg Sullivan		Direct Line: (716 735-6325 Cell Phone: (610) 635-6400 Email: greg.sullivan@fmc.com
Facility Environmental Health and Safety Manager		Contact Information
Name: Gina Senia		Direct Line: (716) 735-6324 Cell Phone: (716) 200-6832 Email: gina.senia@fmc.com
Facility Environmental Health and Safety Specialist		Contact Information
Name: Ryan Farrell		Direct Line: (716) 735-6308 Cell Phone: (716) 481-2425 Email:ryan.farrell@fmc.com
Contractor Site Supervisor		Contact Information
TBD		