1. IDENTIFICATION

Product name:	**Vulcan**
Chemical name of active ingredient(s):	Chlorpyrifos: O,O-diethyl-O-(3,5,6-trichloro-2-pyridinyl) phosphorothioate
Manufacturer:	Makhteshim Agan of North America, Inc. 3120 Highwoods Blvd., Suite 100 Raleigh, NC 27604 Phone: 919-256-9300
For fire, spill, and/or leak emergencies, contact Infotrac:	Phone: 1-800-535-5053
For medical emergencies and health and safety inquiries, contact Prosar:	Phone: 1-877-250-9291

2. COMPOSITION/INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS NUMBER	%	ACGIH/TLV	OSHA/PEL	OTHER	NTP/IARC/OSHA (Carcinogen)
Chlorpyrifos	2921-88-2	39.5	0.1 mg/m^3 *(TWA)	NA	NA	NA
Heavy aromatic petroleum hydrocarbons	64742-94-5	34.2-37.3	525 mg/m^3 (TWA)	NA	NA	NA

* Inhalable fraction vapor.

3. HAZARDS IDENTIFICATIONS

PHYSICAL PROPERTIES:

Appearance: Dark amber liquid
Odor: Mild odor

EMERGENCY OVERVIEW: CAUTION. Harmful if swallowed. Causes moderate eye irritation. Avoid contact with eyes or clothing. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, using tobacco or using the toilet.

SYMPTOMS OF OVER EXPOSURE: Headaches, nausea, vomiting, cramps, weakness, blurred vision, pinpoint pupils, tightness in chest, labored breathing, nervousness, sweating, watering of eyes, drooling, muscle spasms and coma

POTENTIAL HEALTH EFFECTS:

Ingestion: Harmful if swallowed.
Eye: Irritating, and may injure eye tissue if not removed promptly.
Skin: Harmful if absorbed through the skin. Large exposures could be fatal.
Inhalation: Vapor or mist concentrations may be harmful if inhaled. High concentrations could be fatal.

4.FIRST AID MEASURES

FIRST AID Organophosphate	
IF SWALLOWED:	• Call a poison control center or doctor immediately for treatment advice. • Do not give any liquid to a person. • Do not induce vomiting unless told to do so by a poison control center or doctor. • Do not give anything by mouth to an unconscious person.
IF IN EYES:	• Hold eye open and rinse slowly and gently with water for 15-20 minutes. • Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. • Call a poison control center or doctor for treatment advice.
IF ON SKIN OR CLOTHING:	• Take off contaminated clothing. • Rinse skin immediately with plenty of water for 15-20 minutes. • Call a poison control center or doctor for treatment advice.
IF INHALED:	• Move person to fresh air. • If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible.

	• Call a poison control center or doctor for further treatment advice.

Have the product container or label with you when calling a poison control center or doctor or going for treatment.
Note to Physician: This product contains an organophosphate that inhibits cholinesterase. Treat symptomatically. If exposed, plasma and red blood cell cholinesterase tests may indicate significance of exposure (baseline data are useful). Atropine, only by injection, is the preferable antidote. Oximes, such as 2-PAM/protopam, may be therapeutic if used early; however, use only in conjunction with atropine. In case of severe acute poisoning, use antidote immediately after establishing an open airway and respiration. Contains petroleum distillate. Vomiting may induce aspiration pneumonia.

5. FIRE FIGHTING MEASURES

FLASH POINT: 228° F (108.9° C)
FLAMMABLE LIMITS: N/A
EXTINGUISHING MEDIA: Foam, CO_2, dry chemical
FIRE & EXPLOSION HAZARDS: Foam fire extinguishing system is preferred because uncontrolled water can spread possible contamination. Toxic, irritating gases may be formed under fire conditions. Rapid decomposition above 320-392°F (160-200° C) can occur. Violent rupture due to over-pressurization may occur at temperatures generated during a fire.
FIRE-FIGHTING EQUIPMENT: Use positive-pressure self-contained breathing apparatus and full protective clothing.

6. ACCIDENTAL RELEASE MEASURES

ACTION TO TAKE FOR SPILLS/LEAKS: Clean up spills immediately, using precautions described in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering.
Small Spill: Absorb spill with inert material such as dry sand, vermiculite or fuller's earth, then place in a chemical waste container. Rinse area with dilute soda ash and place rinsate into chemical waste container.
Large Spill: Same as for small spills; may neutralize with dilute alkaline solutions of soda and ash and place into chemical waste container. Do not allow material to run off into soil, drainage systems, or bodies of water. Notify and consult with proper regulatory authorities.

7. HANDLING AND STORAGE

PRECAUTIONS TO BE TAKEN IN HANDLING: Keep container closed when not in use. Handle and open container in a manner as to prevent spillage. Do not contaminate water, food or feed by storage, disposal or by cleaning equipment. Do not reuse empty container. If container is damaged or spill occurs, use product immediately or dispose of product and damaged container as indicated in Section 13.

PRECAUTIONS TO BE TAKEN IN STORAGE: Store in original container in secured dry storage area. Prevent cross-contamination with other pesticides and fertilizers. Do not contaminate water, food or feed by storage or disposal.

STORAGE TEMPERATURE (MIN/MAX): Do not store above 100° F for extended periods of time. Storage below 20° F may result in the formation of crystals. If product crystallizes, store at 50 to70° F and agitate to re-dissolve crystals.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

THE FOLLOWING RECOMMENDATIONS FOR EXPOSURE CONTROLS/PERSONAL PROTECTION ARE INTENDED FOR THE MANUFACTURE, FORMULATION, PACKAGING AND USE OF THIS PRODUCT.

FOR COMMERCIAL APPLICATIONS AND/OR ON-FARM APPLICATIONS CONSULT THE PRODUCT LABEL.

Materials that are chemical-resistant to this product are barrier laminate, nitrile rubber, neoprene rubber, or viton rubber.

SKIN PROTECTION: Wear coveralls over long-sleeved shirt and long pants, chemical-resistant footwear plus socks, chemical-resistant apron when mixing or loading or exposed to the concentrate, and chemical-resistant headgear for overhead exposure.

EYE PROTECTION: Use chemical goggles. If vapor exposure causes eye discomfort, use a NIOSH approved full-face respirator.

HAND PROTECTION: Chemical-resistant gloves, such as barrier laminate or butyl rubber ≥14 mils.
RESPIRATOR REQUIREMENTS: Atmospheric levels should be maintained below the exposure guidelines. When respiratory protection is required, use a NIOSH-approved dust mist filtering respirator with any R, P, or HE filter.
ADDITIONAL PROTECTIVE MEASURES: Discard clothing and other absorbent materials that have been drenched or heavily contaminated with this product's concentrate. Do not reuse them. Follow manufacturer's instructions for cleaning and maintaining PPE. If no such instructions for washables exist, use detergent and hot water. Keep and wash PPE separately from other laundry.

USER SAFETY RECOMMENDATIONS:

Users should:

- Wash hands thoroughly with soap and water after handling and before eating, drinking, chewing gum, using tobacco, or using the toilet.
- Remove and wash contaminated clothing before reuse.
- Remove clothing/PPE immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
- Remove PPE immediately after handling this product. Wash outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

EXPOSURE GUIDELINES: Refer to Section 2.
ENGINEERING CONTROLS: Refer to product label.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Dark amber liquid
ODOR: Mild odor
FLASH POINT: 228° F (108.9°C)
pH: 4.05 (1% dispersion)
DENSITY: 1.141 g/cc (9.52 lb/gal)@24°C

10. STABILITY AND REACTIVITY

CONDITIONS TO AVOID: Avoid heating above 60°C (100°F). Chlorpyrifos undergoes exothermic decomposition at approximately 130°C (266°F), which can lead to higher temperatures and violent decomposition if generated heat is not removed. Contains petroleum derivative solvent-will burn.
SPECIFIC MATERIALS TO AVOID: Strong alkalis, amines and oxidizers.
HAZARDOUS DECOMPOSITION PRODUCTS: Under fire conditions, hydrogen chloride, ethyl sulfide, diethyl sulfide and nitrogen oxides can be formed.
HAZARDOUS POLYMERIZATION: Not known to occur.

11. TOXICOLOGICAL INFORMATION

ACUTE TOXICITY/IRRITATION STUDIES

Acute Oral LD50 (Rat):	510 mg/kg
Acute Dermal LD50 (Rat):	>5,050 mg/kg
Acute Inhalation LC50 (Rat):	2.30 mg/L (4-hr)
Eye Irritation (Rabbit):	Moderately irritating.
Dermal Irritation (Rabbit):	Slightly irritating.
Dermal Sensitization (Guinea Pig):	Not a skin sensitizer

EYE: May cause moderate eye irritation and/or corneal injury. Vapors may irritate the eyes.
SKIN: A test in guinea pigs indicated that this product may have weak skin sensitization potential. However, experience in the manufacture and use of this product has not provided evidence for skin sensitizing properties. The product did not sensitize human subjects when tasted at an end-use dilution. A single prolonged exposure, is not likely to result in the material being absorbed through the skin in harmful amounts.
INGESTION: Single dose oral toxicity is moderate. Small amounts swallowed incidental to normal handling operations are not likely to cause injury; however, swallowing larger amounts may cause lung damage or death due to chemical pneumonia.
INHALATION: Excessive exposure may produce organophosphate-type cholinesterase inhibition. Excessive vapor concentrations are attainable and could be hazardous on single exposure. Excessive exposure to solvent

may cause respiratory irritation and central nervous system depression. Signs and symptoms of central nervous system depression are in order of increasing exposure, headache, dizziness, drowsiness, and incoordination.
SYSTEMIC (OTHER TARGET ORGAN EFFECTS): Excessive exposure may produce organophosphate-type cholinesterase inhibition. Signs and symptoms of excessive exposure to chlorpyrifos may be headache, dizziness, incoordination, muscle twitching, tremors, nausea, abdominal cramps, diarrhea, sweating, pinpoint pupils, blurred vision, salivation, tearing, tightness in chest, excessive urination, convulsions. Chlorpyrifos produced mild adrenal effects when fed to rats, but only at doses that greatly exceeded any exposures that would be received during normal use of this product. Solvent has been reported to cause liver, kidney, and blood effects at high exposure levels.
CANCER INFORMATION: Chlorpyrifos did not cause cancer in laboratory animals.
TERATOLOGY (BIRTH DEFECTS): Chlorpyrifos did not cause birth defects in laboratory animals. Solvent was toxic to the fetus in laboratory animal tests, but only at doses that were toxic to the mothers. Very high concentrations of solvent (producing severe toxicity to adult animals induced an increase in cleft palate in mice, which is a common developmental abnormality in mice and is associated with stress to the maternal animals. No malformations were induced at exposures less than those causing severe toxicity to the adult animals.
REPRODUCTIVE EFFECTS: Chlorpyrifos did not interfere with fertility in reproduction studies in laboratory animals.
MUTAGENICITY (EFFECTS ON GENETIC MATERIAL): Results of in-vitro (”test tube”) and animal mutagenicity tests on the aromatic solvent have been negative. Based on a majority of negative data and some equivocal or marginally positive results, chlorpyrifos is considered to have minimal mutagenic potential.

12. ECOLOGICAL INFORMATION

ENVIRONMENTAL HAZARDS: This pesticide is toxic to fish, aquatic invertebrates, small mammals, and birds. Do not apply directly to water, or to areas where surface water is present, or to intertidal areas below the mean high water mark. Drift and runoff may be hazardous to aquatic organisms in water adjacent to treated areas. Do not contaminate water when disposing of equipment washwater or rinsate. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops or weeds if bees are visiting the treatment area.

ENVIROMENTAL FATE:
MOVEMENT AND PARTITIONING: Based on information for chlorpyrifos and components of aromatic hydrocarbons. Bioconcentration potential is moderate (BCF is between 100 and 3000 or Log Pow between 3 and 5).

DEGRADATION & PERSISTENCE: Based on information for chlorpyrifos.
The photolysis half-life in water is 3-4 weeks.
Tropospheric half-life is estimated to be 1.4 hours.
Degradation is expected in the soil environment within days to weeks.
Under aerobic soil conditions the half-life is generally 30-60 days.
Based on information for components of aromatic hydrocarbons.
Biodegradation under aerobic static laboratory conditions is high (BOD 20 or BOD28.ThOD is >40%).

ECOTOXICOLOGY: Chlorpyrifos:
Material is very highly toxic to aquatic organisms on an acute basis (LC_{50}/EC_{50} <0.1 MG/L in most sensitive species).
Material is highly toxic to birds on a dietary basis (LC_{50} between 50 and 5000ppm).
Material is moderately toxic to birds on an acute basis (LD_{50} is between 51 and 5000 mg/kg).

Heavy aromatic petroleum hydrocarbons:
Material is moderately toxic to aquatic organisms on an acute basis (LC_{50}/EC_{50} is between 1 and 10 mg/L in most sensitive specifies).
Material is practically non-toxic to birds on a dietary basis (LD_{50} is >5000ppm).
Material is practically non-toxic to birds on an acute basis (LD_{50} is >2000mg/kg).

13. DISPOSAL CONSIDERATIONS

PESTICIDE DISPOSAL: Open dumping is prohibited. Pesticide wastes are toxic. Improper disposal of excess pesticide, spray mixture, or rinsate is a violation of Federal law. If these wastes cannot be disposed of by use according to label instructions, contact your state pesticide or environmental control agency or the hazardous waste representative at the nearest EPA Regional Office for guidance.

CONTAINER DISPOSAL: Dispose of product containers, waste containers, and residues according to label instructions and local, state, and federal health and environmental regulations.

14. TRANSPORT INFORMATION

DOT CLASSIFICATION:

Non-bulk: UN3082, RQ, Environmentally Hazardous Substance, Liquid, N.O.S. (Chlorpyrifos), 9, PG III
Bulk: UN3082, RQ, Environmentally Hazardous Substance, Liquid, N.O.S. (Chlorpyrifos), 9, PG III, Marine pollutant

INTERNATIONAL TRANSPORTATION:

IMO (vessel): UN3082, RQ, Environmentally Hazardous Substance, Liquid, N.O.S. (Chlorpyrifos), 9, PG III, Marine pollutant
IATA (air): UN3082, RQ, Environmentally Hazardous Substance, Liquid, N.O.S. (Chlorpyrifos), 9, PG III, Marine pollutant

15. REGULATORY INFORMATION

SARA TITLE III CLASSIFICATION:

Section 302: Not applicable.
Section 311/312: Acute health hazard (immediate)
Chronic health hazard (delayed)
Section 313: Not applicable

CA PROPOSITION 65: Not applicable
CERCLA RQ: Chlorpyrifos RQ=1 lbs.
RCRA CLASSIFICATION: Under RCRA, it is the responsibility of the product user to determine at the time of disposal, whether a material containing the product or derived from the product should be classified as a hazardous waste.
TSCA STATUS: The ingredients of this product are listed on the TSCA inventory or are exempt.

16. OTHER INFORMATION

NFPA HAZARD RATINGS	NFPA	HMIS		
HEALTH:	2	2	0	MINIMAL
FLAMMABILITY:	1	1	1	SLIGHT
REACTIVITY:	1	1	2	MODERATE
			3	HIGH
			4	SEVERE

MSDS DATE: 2-1-13. Supercedes version dated 4-11-12. Changes made to Sections 1, 3, 8, and 11.

The information herein is given in good faith, but no warrant, express or implied, is made. Consult Makhteshim-Agan of North America, Inc. for further information.