

Midge Management and Monitoring Plan

Omaha Wastewater Treatment Plant



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Midge Management and Monitoring Plan

Omaha Wastewater Treatment Plant

Client: Watercare Services Limited

Co No.: N/A

Prepared by

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Document Midge Management and Monitoring Plan

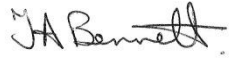

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Rev	Revision Date	Details	Authorised	
			Name/Position	Signature
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1.0 Introduction

1.1 Purpose

This Midge Management and Monitoring Plan (MMMP) has been developed to describe the steps required to control pest midge populations at the Omaha Wastewater Treatment Plant (WWTP). Under General Condition 12 of consent bundle BUN20454939, which includes Discharge Permits DIS60050490, DIS60050606 and DIS60050574, and Land Use Consent LUC60012037, this MMMP forms part of the Omaha WWTP Environmental Management Plan (EMP).

Specific Conditions 37 and 38 of the Wastewater Discharge Permits (DIS60050490 and DIS60050606) state the following:

-
37. *Within one month of commencement of the activity, the consent holder is to prepare and maintain a Midge Management and Monitoring Plan, as part of the Environmental Management Plan, for controlling pest midges at the Omaha Wastewater Treatment Plant.*
38. *As a minimum, the Midge Management and Monitoring Plan is to specify:*
- a. Midge monitoring locations, methodology and frequency;*
 - b. Methods for controlling midge populations, including the use of chemical pesticides, treatment process adjustments and measures to enhance biological control;*
 - c. A process for responding to midge complaints;*
 - d. A procedure for modifying the Midge Management and Monitoring Plan, including consultation with interested parties (including the Omaha Wastewater Treatment Plant Consultative Group) and the Team Leader, Northern Monitoring Compliance Unit, Auckland Council; and*
 - e. Any other issue considered important to the consent holder.*
-

The intent of this MMMP is to ensure Watercare Services Limited (Watercare), as the consent holder, operates and manages the WWTP in a manner which will avoid, remedy or mitigate any potential nuisance from midge populations arising as a result of plant operation.

This MMMP outlines procedures for Watercare staff and sub-contractors to follow, under both normal and abnormal operating conditions.

1.2 MMMP approval and acceptance procedures

In accordance with Specific Condition 39, during preparation of this MMMP consultation will be undertaken with the owners/occupiers of the properties immediately adjacent to the WWTP and other key stakeholders within the surrounding community. This includes submission of a draft MMMP for comment and allowing 10 working days for stakeholder response. A summary of the consultation process and stakeholder feedback will be included in Appendix A once the consultation process and review is complete.

Immediately upon approval from Auckland Council's Northern Monitoring Team Leader this MMMP becomes operable. As such, all WWTP operations shall be carried out in accordance with the provisions in this MMMP.

This MMMP is a live document; as such it may require amendment from time-to-time in order to improve midge management and monitoring procedures. Any amendments will require consultation

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with key stakeholders, including the Omaha Wastewater Treatment Plant Consultative Group¹, and must be approved by Auckland Council's Northern Monitoring Team Leader.

1.3 Responsibility and authority

Watercare Services Limited (Watercare) has the overall responsibility for ensuring that the procedures outlined in this MMMP are followed. All Watercare staff and sub-contractors working at the Omaha WWTP must be aware of the procedures within this MMMP and the conditions of the Resource Consents.

In the event that changes to the plan are required, it is the responsibility of Watercare to ensure that:

- Any updates and/or amendments are reflected in a revised MMMP;
- All Watercare staff and sub-contractors are aware of the revised MMMP; and
- The conditions of the Wastewater Discharge consent continue to be met.

2.0 Site Description

2.1 WWTP Site layout

The Omaha WWTP site is located on Jones Road, Tawharanui Peninsula, approximately 75km north of central Auckland and is comprised of a treatment plant and main irrigation fields (Figure 1). A secondary irrigation field is located approximately 3km east of the plant at the southern end of the Mangatawhiri Sand Spit on the Omaha Golf Course. The WWTP site covers an area of approximately 52ha and is designated for 'Wastewater Purposes' under the Auckland Unitary Plan: Operative in part (AUP: Op).

The WWTP services the Omaha, Point Wells and Matakana communities. Under the Resource Consent bundle (BUN20454939) Watercare will continue to treat raw sewage at the Omaha WWTP and proposes to discharge an increased quantity of treated wastewater from the WWTP to the irrigation fields located on the WWTP and golf club (Figure 1). This will include an extension of the main irrigation fields to include an extra 9.1ha of irrigation field which has been proposed for the northern extent of the WWTP site.

The treatment plant is located in the western portion of the WWTP site and consists of three treatment ponds: an aerated lagoon, an oxidation pond and storage dam; and additional treatment devices (refer to Figure 1). The main irrigation fields are located in the north of the WWTP site and are comprised of approximately:

- 7.6ha of eucalyptus plantation;
- 5.5ha of native scrub;
- 4.3ha of grassland; and
- 9.1ha of mixed scrub and fernland (proposed).

The secondary irrigation area located on Omaha Golf Course is divided into discrete management blocks within approximately 5.7ha of golf course play area and 0.6ha of sand dunes.

¹ The Omaha Wastewater Treatment Plant Consultative Group is comprised of representatives from the local community that was established in order to form community consensus on matters concerning WWTP operation, particularly managing and enhancing the receiving environment.

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2.2 Site activities

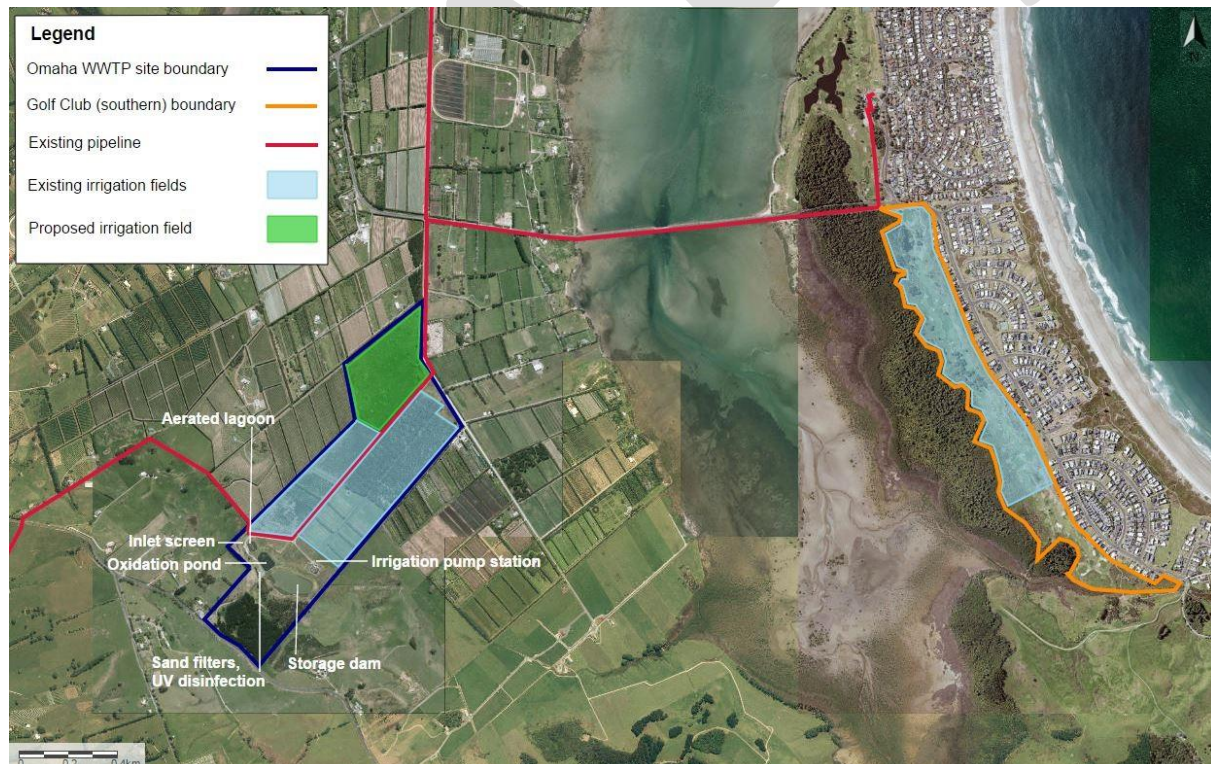
The WWTP treats raw sewage by means of a six-stage treatment process. During the first three stages of treatment, wastewater is processed through the pond system:

- Aerated lagoon – after passing through the inlet screen, the wastewater undergoes a Modified Ludzack-Ettinger activated sludge process which removes BOD₅ and reduces total nitrogen and ammonia concentrations.
- Oxidation pond – receives wastewater from the aeration pond where it undergoes further polishing treatment (i.e. aeration and settling).
- Storage dam – Wastewater is stored in here before it receives the final three stages of treatment. The storage dam also provides buffer storage during periods of heavy rain, particularly through the winter months.

The treated wastewater undergoes further purification in stages four to six. During this phase of the process the wastewater passes through sub-surface flow gravel beds prior to receiving pressure filtration and UV disinfection. Treated wastewater is pumped to the main irrigation fields adjacent to the WWTP and piped to the secondary irrigation field via the Broadlands Drive Causeway. Treated wastewater is discharged to the fields via surface and subsurface drip irrigation systems.

The pond system at the WWTP site (Jones Road) provides ideal breeding grounds for midge species (refer to Section 3.1); as such, nuisance populations are primarily associated with the treatment of wastewater in the aeration lagoon, oxidation pond and storage dam.

Figure 1 Omaha WWTP and irrigation field layout



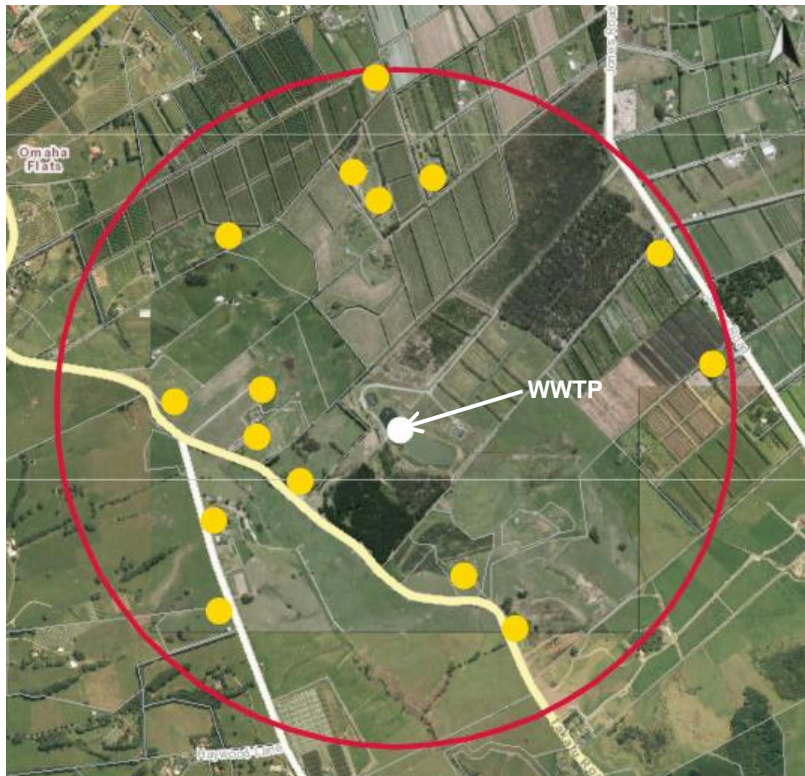
2.3 Surrounding land uses

The land surrounding the WWTP is comprised of farmland and rural properties (Figure 1). The irrigation field on Omaha Golf Club land is surrounded by the Omaha Taniko Wetlands Scientific Reserve to the west and the Omaha settlement to the east. The sites are separated by the Waikokopu Creek, Whangateau Harbour, while Little Omaha Bay is located on the eastern side of Mangatawhiri Sand Spit.

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Fifteen rural properties have been identified as receptors that are potentially sensitive to midge nuisance (refer to Figure 2). Predominant winds in the area are south-westerly².

Figure 2 Neighbouring properties that are potentially sensitive receptors of nuisance midge populations



3.0 Target Midge Species

A non-biting midge species (*Chironomus zealandicus*) has been identified as a potential nuisance risk for neighbouring properties adjacent to the WWTP site.

3.1 Midge life cycle

Midges are gnat-like flies that have a four stage (adult midge, egg mass, larvae and pupa), 20-day life cycle which is closely associated with freshwater waterbodies, particularly shallow lakes or ponds.

The eggs are laid on or within the water, or on matter immediately adjacent to the water's edge. The speed at which the larvae develop is dependent on sediment temperatures and organic content. The larvae are timed to pupate at the same time, resulting in large mating swarms (4-6m in height) that arise from the water during dusk. During the day adult midges will take refuge in vegetation surrounding waterbodies. These swarms generally do not move far from the water; however, the adult midge is drawn to light and strong winds can blow swarm formations some distances, causing nuisance on neighbouring properties.

Their high fecundity rate leads to a rapid rate of intrinsic population increase, enabling populations to multiply at phenomenal rates. Under the right conditions, several generations can be produced over the summer period, with fewer in colder summers and more during hot summers.

² Retrieved from: https://www.windfinder.com/windstatistics/omaha?fsport=omaha_estuary

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4.0 Midge Monitoring and Management

4.1 Midge monitoring

To ensure the risk of adult swarms are minimised, Watercare staff, or sub-contractors, should conduct regular monitoring of midge larvae throughout the year, increasing monitoring during warmer months and peak breeding period (October to the end of April). An example monitoring field sheet is provided in Appendix B.

4.1.1 Frequency

During the warmer months (December to April), midge monitoring should be undertaken weekly under normal conditions; however, under circumstances where >15mm of rain falls³ during this period monitoring should occur as soon as possible after the rainfall event. If monitoring indicates a decline in population between late April and October monitoring frequency can be reduced to once a fortnight.

In instances where monitoring indicates an increase in midge numbers, more frequent monitoring (daily) may be required.

4.1.2 Monitoring locations

There is one monitoring site for adult midges located between the oxidation pond and storage dam (refer to Figure 3) where midge numbers are likely to be at their worst. The monitoring site is in the form of one electric bug zapper which attracts adult midges within the vicinity. One larvae sampling site is located on the edge of the storage dam.

Figure 3 Omaha WWTP midge monitoring sites



³ Following rain, WWTP staff should check rainfall results from the local Auckland Council weather station: Tamahunga @ Quintals Rd at <http://aklc.hydrotel.co.nz/hydrotel/cgi-bin/HydWebserver.cgi/sites/overview?site=1478&district=6&catchment=28>

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4.1.3 Methodology

4.1.3.1 Baseline measures

In order to provide a better indication of whether larval populations are likely to produce nuisance swarms, baseline measures should be obtained outside of peak breeding season for comparison. Baseline measures can be estimated by averaging the number of larvae observed over two consecutive monitoring events undertaken in winter (July). These figures can be obtained from data obtained during previous monitoring years; however, if data is not available data collection should be done as soon as practicable following MMMP approval.

4.1.3.2 Monitoring

During each monitoring event an assessment of resident midge numbers will be made based on the number of dead adult insects observed in the bug zappers and larvae observed in the oxidation and storage ponds.

Assessments of adult midge populations require a visual observation of the catch tray located below the bug zapper (refer to Figure 3). From the catch tray the observer should estimate the percentage of the catch tray which is covered by dead adult midges (refer to Figure 4). After each assessment the tray should be cleaned so that the insect numbers observed during each monitoring event are not cumulative.

Figure 4 Adult midge appearance⁴



The assessment of midge larvae numbers present will be undertaken by means of visual observation at the edge of the oxidation and storage ponds (refer to Figure 3). Assessment within the oxidation pond requires the observer to record the number of larvae (red worms, refer to Figure 5) occurring within a sample area of approximately 0.25m² at the water's edge.

⁴ Photo by Phil Bendle. Retrieved from <http://www.terrain.net.nz/friends-of-te-henui-group/local-flies/common-non-biting-midge.html>, 14/06/17.

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Figure 5 Midge larvae appearance⁵



Assessment of larvae numbers in the storage dam is done by stirring up an area of approximately 0.25m² in the substrate of the shallows at the water's edge. Once settled the observer is to count the number of larvae present within the sample area.

Results can be multiplied by four to obtain an estimate of density per 1m².

4.1.4 Alert levels and responses

Two alert levels are identified relation to increases in observed numbers in adult (1) and larvae (2) populations, each requiring a different response action:

1. Adult midges: If the amount of dead adult midges observed in the bug zapper catch trays covers at least 25% of the tray surface during one monitoring event, this will prompt an increase in monitoring frequency. Daily monitoring checks should be undertaken until the larvae alert level (see 2. below) is triggered or there is an observed decrease in the size or number of larvae within sampled areas over two consecutive days.
2. If the size or number of midge larvae observed in at least one of the ponds over two consecutive monitoring events has increased to levels at least 25% greater than baseline values (refer to Section 4.1.3.1), then a second response action is triggered. This will require the application of spray controls (refer to Section 6.0) by an approved contractor and will be in the form of a subsurface application during January and February, and a surface spray in other months.

5.0 Contingency Plan

In the event that a midge issue arises unexpectedly, despite the monitoring results (e.g. via complaint), more frequent monitoring checks will be undertaken as per Section 4.1.3. If the issue continues and monitoring results are ambiguous then the response actions according to Section 4.1.4 will be implemented (refer to Sections 6.0 and 7.0).

⁵ Retrieved from <http://kotunews.weebly.com/main/category/insects>, 14/06/17.

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6.0 Potential control strategies

6.1 Adjustment to WTP treatment processes

Temperature is an important factor in regulating the development of midge larvae. As such, regular (i.e. daily) monitoring of temperature in the treatment ponds will be undertaken, particularly during the summer months, to make predictions regarding the likely timing of adult emergence. When practicable, water levels in the storage dam could be periodically held at low levels (following discharge) when larvae populations are large so as to expose areas of pond edge. Leaving areas exposed for a period of approximately 72 hours will dehydrate and stress the larvae that are positioned above the water line and thus reduce emergence.

This method should be used in conjunction with the controls described in Sections 6.2 and 6.3 when necessary.

6.2 Chemical controls

The chemical controls proposed in this plan are regularly used for the treatment of midge issues at wastewater treatment plants. Naturalyte and Methoprene degrade rapidly under ultra violet light (Naturalyte half-life less than 1 day⁶ and Methoprene half-life of 1-2 days⁷) by photodecomposition and photo isomerisation. Naturalyte and Methoprene are unlikely to persist through the treatment process and be discharged to the irrigation fields.

6.2.1 Methoprene

Methoprene is an insect growth regulator which alters the larval hormonal activity, interfering with their maturation. Methoprene is absorbed by the larvae, where it disrupts normal development and suspends them in the pupal stage. As a result, the larvae are unable to feed and eventually die. Refer to Appendix D for safety guidelines within the Safety Data Sheet.

6.2.1.1 Large-scale application

Methoprene controls may be applied by means of the slow release chemical pellets (e.g. 'Strike Pellets' manufactured by Wellmark International) into the oxidation and storage ponds. Ideally these will be spread evenly across the water surface using a mechanical spreader mounted on the front of a small boat or by means of a backpack blower. This will allow the pellets to sink to the pond beds where they will slowly dissolve over a two to four week period. In order to maintain effective control application should be every 2 weeks at the dilution rate specified in the product user manual.

6.2.1.2 Small-scale application

Methoprene may also be applied to the surface of the ponds in spray form (e.g. 'Strike Ultra (liquid)) on a fortnightly basis at the dilution rate specified in the product user manual. This form of control is not formulated for slow release and best suited for treating smaller problem areas.

6.2.2 Naturalyte

Naturalyte is a spinosad insecticide which affects the nervous system of insects that come in contact with it. Naturalyte causes the muscles to spasm, leading to paralysis and ultimately death. Refer to Appendix D for safety guidelines.

Naturalyte may be applied in spray form (e.g. 'Success Naturalyte' manufactured by Dow AgroSciences) to areas of vegetation directly surrounding the WWTP once every two months at the dilution rate specified in the product user manual.

6.3 Biological controls

There are also opportunities to enhance control strategies using biological controls, such as biological larvicides or predatory fish species.

⁶ Kollman, W.S. *Environmental Fate of Spinosad*. California Department of Pesticide Regulation.

⁷ Garton, C.B. and Bickers, P. (2016). *Controlling Midge Nuisance at Mangere – 10 Years of Operational Experience*. Prepared for Water New Zealand 2016 Annual Conference.

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Bacillus thuringiensis var. israelensis (Bti) is a registered larvicide control for Chironomid midges. Bti is a group of bacteria which are toxic to larvae when consumed, with no evidence to suggest that the bacteria pose a risk to humans or animals. Bti also breaks down very rapidly when exposed to UV light (half-life of 3.8 hours under normal conditions⁸). Because midge larvae feed on organic matter, in wastewater treatment ponds (where organic content is high) Bti application is only effective at high rates of application. This would require doses at 10 times that required by product guidelines to treat mosquito larvae, this limits the economic use of Bti to small habitat where larvae are numerous and is only recommended during instances where larval populations are large.

Introduction of fish species, such as eels (*Anguilla*), which predate midge larvae may also be used to control nuisance swarms. Shortfin eels (*A. australis*) are the most tolerant native fish species and can survive environments with high water temperatures and low dissolved oxygen. If dissolved oxygen levels can be maintained at a minimum of approximately 5mg/L juvenile eels (<20cm) may be introduced to the storage dam to naturally control midge populations. Monitoring would be required and if successful the eels may need to be harvested from time to time to maintain populations at manageable and effective sizes.

7.0 Responding to Complaints

In the event a complaint is received regarding potential midge nuisance from the WWTP, Watercare will log the complaint immediately using the midge complaint record form in Appendix C. The log will include the following details:

- The date, time, location and nature of the complaint;
- The name, contact details and address of the complainant (unless the wish to remain anonymous);
- The actions taken to remedy the issue;
- Any equipment failure and remedial action taken;
- The weather conditions at the time of the complaint, including estimates of wind direction and strength, temperature and cloud cover; and
- The date and details of the staff member logging the entry.

In accordance with condition 10, the details of any complaints that may compromise consent compliance must be reported to Auckland Council's Northern Monitoring Team Leader within 24 hours of the complaint being received, or on the next working day. Details of all other complaints must be included in the plant's annual report.

8.0 Roles and Responsibilities

8.1 Northern Operations Controller

The Northern Operations Controller will be responsible for:

- Ensuring midge monitoring and control strategies are adequate and performing as expected;
- Identifying the potential need for further control;
- Being the central point of contact for all complaints;
- Ensuring complaints are assessed and dealt with;
- Dealing with the resolution of any complaints which are deemed as being significant;
- Liaising with Auckland Council to provide a progress update on any complaint deemed significant (from acknowledgement of complaint to resolution);

⁸ Extoxnet Pesticide Information Profile *Bacillus Thuringiensis*. <http://pmep.cce.cornell.edu/profiles/extoxnet/24d-captan/bt-ext.html>

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- Liaising with local stakeholders to provide a progress update on any complaint deemed significant (from acknowledgement of complaint to resolution); and
- Ownership of complaints that have been made and ensuring action is being taken to identify and, where appropriate, mitigate the cause.

8.2 Watercare staff and sub-contractors

All staff will be made aware of the midge monitoring and control methodologies that have been established as part of standard operating procedures for the plant. All relevant staff and sub-contractors will be trained in all aspects of midge management, midge control issues and any other matters specified in this MMMP.

9.0 Training and Competencies

The Northern Operations Controller will undertake a periodic review of the training needs of all staff and sub-contractors to ensure effective midge management and will ensure all people performing tasks on behalf of the Omaha WWTP have the appropriate training and competency to reduce the potential for nuisance midge swarms.

Training provisions will ensure that all staff:

- Are fully aware of the requirements of the MMMP and are familiar with the plant's operational procedures;
- Are fully aware of the requirements of resource consents applicable to WWTP operations;
- Understand the responsibilities and potential effects of their individual jobs and actions required to ensure effective midge management;
- Are competent to carry out any actions required under this MMMP for which they are responsible;

The Northern Operations Controller is responsible for ensuring that all training provided is recorded and that these records are kept as part of the company records system.

10.0 Annual Reporting

A summary of any incidences or complaints regarding nuisance midge swarms potentially resulting from the WWTP shall be submitted as part of the plant's annual report as required by condition 16. This may include the following:

- A summary of data from routine midge monitoring
- Details of any alert levels that have been triggered and the resulting control strategies applied
- Details of any midge complaints, actions undertaken to address the issue and follow up with the complainant
- Critical analysis of plant performance in respect to midge swarms
- Details of any operational changes and upgrades made to the plant

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Appendix A

Stakeholder
Consultation and
Feedback

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Appendix B

Example Midge
Monitoring Form

Routine Midge Monitoring Form

Site: Omaha WWTP _____

Assessors name: _____

Date: _____

Time: _____

Midge Monitoring

Record pond characteristics and weather conditions in the tables provided below

Pond characteristics			
	Aeration	Oxidation	Storage
Colour			
DO (mg/L)			
Water level:			
High			
Medium			
Low			

Weather data	
Wind direction (tick)	
N	S
NE	SW
E	W
SE	NW

Plant operation comments:

Wind speed (tick)	
0	_____ Calm
1	_____ Ligth air
2	_____ Light breeze
3	_____ Gentle breeze
4	_____ Moderate breeze
5	_____ Strong breeze
6	_____ Strong Wind
7	_____ Near gale

Midge population estimates

Adult midge bug zapper monitoring:

Sample location	Estimated tray coverage (%)	<25% (tick)
Storage dam		
Oxidation pond		
Aeration pond		

Cloud cover (tick)	
0	_____ Clear sky
1	_____ Sunny
2	_____ Mostly sunny
3	_____ mixed sun/overcast
4	_____ Overcast
5	_____ Raining
F	_____ Fog/mist

Larvae pond edge monitoring:

Sample location	Number of larvae present (per 0.25m ²)	No. per m ² (x 4)
Storage dam		
Oxidation pond		

Temperature (tick)	
Cold	_____
Cool	_____ C° (if known):
Mild	_____
Warm	_____
Hot	_____

Further comments:

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Appendix C

Example Midge
Complaint Form

Midge Complaint Record Form

Site: Omaha WWTP _____

Recorders name: _____

Date: _____

Time: _____

Complainant details

Note down complainant's details for follow up or indicate if they want to remain anonymous

Name: _____

Anonymous (?): _____

Address: _____

Phone: _____

Complaint: _____

Complaint details

Ask complainant if they can provide further details (see below). Read out options for the complainant to choose from.

Date: _____ Time: _____

Nature of midge activity observed: _____

Frequency of the nuisance (transient, sporadic, persistent, continuous): _____

Duration: _____

Weather conditions

Wind direction (tick)

N _____ S _____

NE _____ SW _____

E _____ W _____

SE _____ NW _____

Wind speed (tick)

0 _____ Calm

1 _____ Ligth air

2 _____ Light breeze

3 _____ Gentle breeze

4 _____ Moderate breeze

5 _____ Strong breeze

6 _____ Strong Wind

7 _____ Near gale

Cloud cover (tick)

0 _____ Clear sky

1 _____ Sunny

2 _____ Mostly sunny

3 _____ mixed sun/overcast

4 _____ Overcast

5 _____ Raining

F _____ Fog/mist

Temperature (tick)

Cold _____

Cool _____ C° (if known): _____

Mild _____

Warm _____

Hot _____

Actions required

Response actions require: _____

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Appendix D

Chemical control MSDS

SAFETY DATA SHEET (SDS)

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name:	NaturaLyte (45X) (0000 through 4000 Series)
Product Number:	None
Formula:	Solution: Acetic Acid, Sodium Chloride, Potassium Chloride, Calcium Chloride, Magnesium Chloride, Dextrose
Product Use:	Medical Care
Restrictions on Use:	None

SUPPLIER INFORMATION: Fresenius Medical Care

Address: Renal Product Technologies
920 Winter Street
Waltham, MA 02451

Phone Number: 1-800-662-1237
Fax Number: N/A
Email Address: N/A

Emergency Contact Information:
CHEMTREC 1-800-424-9300

2. HAZARDS IDENTIFICATION

CLASSIFICATION AND LABELING (GHS / HMIS / NFPA):

<i>GHS Status</i>		
<i>Pictogram</i> <i>None</i>	<i>Classification</i> <i>NOT CLASSIFIED</i>	<i>Signal Word and Hazard Statements</i> <i>None</i>

<i>HMIS Ratings</i>	
<i>HEALTH</i>	<i>1</i>
<i>FLAMMABILITY</i>	<i>0</i>
<i>REACTIVITY</i>	<i>0</i>
<i>PERSONAL PROTECTION</i>	<i>B</i>

<i>NFPA Ratings</i>	
<i>HEALTH</i>	<i>1</i>
<i>FLAMMABILITY</i>	<i>0</i>
<i>REACTIVITY</i>	<i>0</i>
<i>SPECIFIC HAZARD</i>	<i>---</i>

POTENTIAL HEALTH EFFECTS

ACUTE EFFECTS:

Eye: Overexposure associated with non-standard use may cause tearing and irritation.

Skin: Overexposure associated with non-standard use may cause irritation.

Inhalation: May cause pulmonary irritation.

Ingestion: May result in hypotension, hypertension or tachycardia.

CHRONIC EFFECTS:

None expected.



3. COMPOSITION/INFORMATION ON INGREDIENTS

Components	CAS No.	Weight % Range ^a
Acetic Acid	64-19-7	0.8
Sodium Chloride	7647-14-5	20.4
Potassium Chloride	7447-40-7	0.5
Calcium Chloride	10035-04-8	0.4
Magnesium Chloride	7791-00-6	0.2
Dextrose	50-99-7	3.8

a. Product composed of 73.9% water.

4. FIRST AID MEASURES

PROCEDURES

- Eye Contact: Immediately flush eyes with copious amounts of water for at least 15 minutes. Get medical attention if irritation, pain, swelling, tearing or other symptoms persist.
- Skin Contact: Wash with soap and water. Get medical attention if irritation, pain, swelling or other symptoms persist.
- Inhalation: Move to fresh air. Get medical attention if irritation or other symptoms persist.
- Ingestion: Contact a physician.
- Note to Physicians: Use general supportive care.

5. FIRE FIGHTING MEASURES

- Unusual Fire and Explosion Hazards: None.
- Extinguishing Media: Alcohol foam, water fog, carbon dioxide or dry chemical as appropriate for surrounding fire.
- Special Firefighting Procedures: Use procedures, protective clothing, breathing apparatus, and equipment appropriate for surrounding fire.

6. ACCIDENTAL RELEASE MEASURES

- Personal precautions: In case of accidental bulk release, wear appropriate personal protective equipment (PPE), including goggles, boots, gloves, and clothing which covers exposed areas of the arms, legs and torso (PPE must be selected in accordance with Section 8 of this SDS).
- Environmental precautions: Avoid dispersal of spilled material and runoff to the environment. Avoid contact with soil and waterways.
- Methods and materials for containment: Dilute with water or mop up spill.
- Cleanup procedures: Thoroughly collect spill with absorbent material and dispose of in trash.

7. HANDLING AND STORAGE

- Handling:** Transport in original container in accordance with good industrial hygiene and safety practice. Use PPE in accordance with Section 8 of this SDS while handling. It is generally recommended to avoid contact with eyes, skin and clothing. Keep in the original container or an approved alternative made from a compatible material, keep tightly closed when not in use.
- Storage:** Store protected from direct sunlight and away from other chemicals in a dry, cool, well-ventilated area, away from incompatible materials. Keep away from 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.
- Other Precautions:** None known.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Component	OSHA Permissible Exposure Limits (PELs)	American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs)	NIOSH Recommended Exposure Limits (RELs)
Acetic Acid	10 ppm (25 mg/m ³) TWA	10 ppm (25 mg/m ³) TWA, 15 ppm (37 mg/m ³) (STEL)	10 ppm (25 mg/m ³) TWA, 15 ppm (37 mg/m ³) (STEL)
Sodium Chloride	Not established	Not established	Not established
Potassium Chloride	Not established	Not established	Not established
Calcium Chloride	Not established	Not established	Not established
Magnesium Chloride	Not established	Not established	Not established
Dextrose	Not established	Not established	Not established

- Engineering Controls:** Normal building ventilation.
- Eye/Face Protection:** Safety glasses or goggles. Contact lenses should not be worn when working with this material. Maintain eye wash station in area.
- Skin Protection:** Wear gloves and suitable clothing to prevent repeated or prolonged skin contact.
- Respiratory Protection:** Not normally required.
- General Hygiene Considerations:** Wash hands thoroughly after use.

9. PHYSICAL AND CHEMICAL PROPERTIES

Property	Value	Property	Value
<i>Appearance:</i>	Clear aqueous solution	<i>Initial Boiling Point (°F):</i>	Not established
<i>Odor:</i>	Vinegar-like odor	<i>Boiling Range (°F):</i>	Not established
<i>Odor Threshold:</i>	Not established	<i>Melting point:</i>	Not established
<i>Molecular Weight:</i>	Not established	<i>Specific gravity (g/cc):</i>	1.14 – 1.24
<i>Physical State:</i>	Liquid	<i>Viscosity (cps):</i>	Not established
<i>pH:</i>	2.4 - 2.7	<i>Flash Point:</i>	Not combustible
<i>Vapor Pressure (mm Hg):</i>	Not established	<i>Decomposition Temperature:</i>	Not established
<i>Solubility in Water (20 °C):</i>	Completely	<i>Flammability:</i>	Not flammable
<i>Volatiles, Percent by volume:</i>	Not established	<i>Upper/Lower Flammability Limits:</i>	Not established
<i>Vapor Density (air = 1):</i>	Not established	<i>Auto-ignition Temperature:</i>	Not established
<i>Evaporation Rate:</i>	Not established	<i>Octanol/water partition coefficient:</i>	Not established



10. STABILITY AND REACTIVITY

Stability: Stable under normal conditions.
 Reactivity: Not reactive under normal conditions.
 Conditions to Avoid: Strong oxidizing solutions.
 Materials to Avoid: Strong oxidants.

Hazardous Decomposition Products: Carbon dioxide gas.
 Hazardous Polymerization: Will not occur.
 Hazardous reaction conditions: None known.

11. TOXICOLOGICAL INFORMATION

Potential Exposure Routes: Skin, eye, inhalation, ingestion.

ACUTE ANIMAL TOXICITY DATA:

Chemical Substance	Oral LD50 (mg/kg)	Dermal LD50 (mg/kg)	Inhalation LC50 (4-hour) (mg/L)
Acetic Acid	3310 to 3530 in rat	1060 in rat	11.4
Sodium Chloride	3000 in rat	>10,000 in rabbit	Not established
Potassium Chloride	2600 in rat	Not established	Not established
Calcium Chloride	1000 to 4179 in rat	> 5000 in rat	Not established
Magnesium Chloride	2800 in rat	Not established	Not established
Dextrose	Not evaluated	Not evaluated	Not evaluated

Skin Corrosion/Irritation: Not expected under normal use conditions.
 Serious Eye Damage/Irritation: Prolonged or repeated eye exposure to product may cause mild irritation due to presence of acetic acid.
 Respiratory or Skin Sensitization: Data not available.
 Germ Cell Mutagenicity: Not classified
 Carcinogenicity: Not classified
 Reproductive, Teratogenicity, or Developmental Effects: Not classified
 STOT- Single Exposure: Not classified
 STOT- Repeated Exposure: Not classified
 Aspiration Hazard: Not classified
 Neurological Effects: Not classified
 Interactions with Other Chemicals Which Enhance Toxicity: None known.



12. ECOLOGICAL INFORMATION

Not mandatory

12. DISPOSAL CONSIDERATIONS

Dispose of in accordance with Federal, State and/or local rules / regulations

14. TRANSPORT INFORMATION

U.S. DOT Classification: NOT Regulated

15. REGULATORY INFORMATION

Not mandatory

16. OTHER INFORMATION

Company Contacts	Fred Christadore or Larry Park
Telephone:	1-800-662-1237, Extension 101-2580
CHEMTREC:	1-800-424-9300 (Transportation Incidents)

The data included herein are presented according to Fresenius Medical Care North America practices current at the time of preparation hereof, are made available solely for the consideration, investigation and verification of the original recipients hereof and do not constitute a representation or warranty for which Fresenius Medical Care North America assumes responsibility. It is the responsibility of a recipient of this data to remain currently informed on chemical hazard information, to design and update its own safety program and to comply with all national, federal, state and local laws and regulations applicable to safety, occupational health, right to know and environmental protection.

REVISIONS: This SDS was prepared on July 2, 2015 to conform to 29 CFR Parts 1910.1200(g), 1915, and 1926, known as HazCom 2012.

PREPARED BY: Fresenius Medical Care

NOTICE: This product does not legally require an SDS. The data included herein are presented according to Fresenius Medical Care North America practices current at the time of preparation hereof, are made available solely for the consideration, investigation and verification of the original recipients hereof and do not constitute a representation or warranty for which Fresenius Medical Care North America assumes responsibility. It is the responsibility of a recipient of this data to remain informed on chemical hazard information, to design and update its own safety program and to comply with all national, federal, state and local laws and regulations applicable to safety, occupational health, right to know and environmental protection.

Preparation Date: July 2, 2015 Supersedes: June 4, 2012 MSDS



SUMITOMO CHEMICAL

SAFETY DATA SHEET

s-Methoprene TG

According to Preparation of Safety Data Sheets for Hazardous Chemicals Code of Practice, February 2016

SECTION 1: Identification: Product identifier and chemical identity

Product identifier

Product name	s-Methoprene TG
Chemical name	isopropyl (E,E)-(7S)-11-methoxy-3,7,11-trimethyl-2,4-dodecadienoate
CAS number	65733-16-6

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

Application	Insect Growth Regulator
Uses advised against	No specific uses advised against are identified.

Details of the supplier of the safety data sheet

Supplier	www.sumitomo-chem.com.au Sumitomo Chemical Australia Pty Ltd Level 5, 51 Rawson Street, EPPING, NSW 2121 (02) 8752 9000 (02) 8752 9099 Reception@sumitomo-chem.com.au
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Emergency telephone number

Emergency telephone	1800 024 973 (Australia) 0800 243 6225 (New Zealand)
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SECTION 2: Hazard(s) identification

Classification of the substance or mixture

Physical hazards	Not Classified
Health hazards	Skin Irrit. 2 - H315
Environmental hazards	Aquatic Acute 1 - H400

Label elements

Pictogram



Signal word	Warning
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Hazard statements	H315 Causes skin irritation. H400 Very toxic to aquatic life.
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s-Methoprene TG

Precautionary statements	<p>P264 Wash contaminated skin thoroughly after handling.</p> <p>P273 Avoid release to the environment.</p> <p>P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.</p> <p>P302+P352 IF ON SKIN: Wash with plenty of soap and water.</p> <p>P321 Specific treatment (see medical advice on this label).</p> <p>P332+P313 If skin irritation occurs: Get medical advice/ attention.</p> <p>P362+P364 Take off contaminated clothing and wash before reuse.</p> <p>P391 Collect spillage.</p> <p>P501 Dispose of contents/ container in accordance with national regulations.</p>
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Contains s-Methoprene

Other hazards

This product does not contain any substances classified as PBT or vPvB.

SECTION 3: Composition and information on ingredients

Mixtures

s-methoprene	min. 92%
CAS number: 65733-16-6	

SECTION 4: First aid measures

Description of first aid measures

General information	If poisoning occurs, contact a doctor or Poisons Information Centre (Phone Australia 131126; New Zealand 0800 764 766), and follow the advice given. Show this Safety Data Sheet to a doctor.
Inhalation	Move affected person to fresh air and keep warm and at rest in a position comfortable for breathing. Maintain an open airway. Get medical attention.
Ingestion	Rinse mouth thoroughly with water. Do not induce vomiting. Get medical attention.
Skin Contact	Rinse with water.
Eye contact	Get medical attention if any discomfort continues. Hold eyes open and flood with water for at least 15 minutes.
Protection of first aiders	First aid personnel should wear appropriate protective equipment during any rescue.

Most important symptoms and effects, both acute and delayed

General information	The severity of the symptoms described will vary dependent on the concentration and the length of exposure.
Inhalation	A single exposure may cause the following adverse effects: Headache. Exhaustion and weakness.
Ingestion	May cause irritation.
Skin contact	Redness. Irritating to skin.
Eye contact	No specific symptoms known. May be slightly irritating to eyes.

Indication of any immediate medical attention and special treatment needed

Notes for the doctor Treat symptomatically.

SECTION 5: Firefighting measures

s-Methoprene TG

Extinguishing media

Suitable extinguishing media The product is not flammable. Extinguish with alcohol-resistant foam, carbon dioxide, dry powder or water fog. Use fire-extinguishing media suitable for the surrounding fire.

Unsuitable extinguishing media Do not use water jet as an extinguisher, as this will spread the fire.

Special hazards arising from the substance or mixture

Specific hazards Containers can burst violently or explode when heated, due to excessive pressure build-up.

Hazardous combustion products Thermal decomposition or combustion products may include the following substances: Oxides of carbon.

Advice for firefighters

Protective actions during firefighting Avoid breathing fire gases or vapours. Evacuate area. Keep upwind to avoid inhalation of gases, vapours, fumes and smoke. Ventilate closed spaces before entering them. Cool containers exposed to heat with water spray and remove them from the fire area if it can be done without risk. Cool containers exposed to flames with water until well after the fire is out. If a leak or spill has not ignited, use water spray to disperse vapours and protect men stopping the leak. Avoid discharge to the aquatic environment. Control run-off water by containing and keeping it out of sewers and watercourses. If risk of water pollution occurs, notify appropriate authorities.

Special protective equipment for firefighters Wear positive-pressure self-contained breathing apparatus (SCBA) and appropriate protective clothing. Firefighter's clothing conforming to Australia/New Zealand Standards AS/NZS 4967 (for clothing) AS/NZS 1801 (for helmets), AS/NZS 4821 (for protective boots), AS/NZS 1801 (for protective gloves) will provide a basic level of protection for chemical incidents.

SECTION 6: Accidental release measures

Personal precautions, protective equipment and emergency procedures

Personal precautions Wear protective clothing as described in Section 8 of this safety data sheet. No action shall be taken without appropriate training or involving any personal risk. Avoid inhalation of dust and vapours. Use suitable respiratory protection if ventilation is inadequate.

Environmental precautions

Environmental precautions Avoid discharge into drains or watercourses or onto the ground. Avoid discharge to the aquatic environment.

Methods and material for containment and cleaning up

Methods for cleaning up Wear protective clothing as described in Section 8 of this safety data sheet. Clear up spills immediately and dispose of waste safely. Provide adequate ventilation. Small Spillages: Collect spillage. Large Spillages: Absorb spillage with non-combustible, absorbent material. The contaminated absorbent may pose the same hazard as the spilled material. Collect and place in suitable waste disposal containers and seal securely. Label the containers containing waste and contaminated materials and remove from the area as soon as possible. Wash thoroughly after dealing with a spillage. Dangerous for the environment. Do not empty into drains. For waste disposal, see Section 13.

Reference to other sections

Reference to other sections For personal protection, see Section 8. See Section 11 for additional information on health hazards. See Section 12 for additional information on ecological hazards. For waste disposal, see Section 13.

SECTION 7: Handling and storage, including how the chemical may be safely used

Precautions for safe handling

s-Methoprene TG

Usage precautions	Wear protective clothing as described in Section 8 of this safety data sheet. Keep away from food, drink and animal feeding stuffs. Handle all packages and containers carefully to minimise spills. Keep container tightly sealed when not in use. Avoid the formation of mists. Avoid discharge to the aquatic environment. Do not handle until all safety precautions have been read and understood. Do not handle broken packages without protective equipment. Do not reuse empty containers.
Advice on general occupational hygiene	Wash promptly if skin becomes contaminated. Take off contaminated clothing and wash before reuse. Wash contaminated clothing before reuse.
<u>Conditions for safe storage, including any incompatibilities</u>	
Storage precautions	Keep only in the original container. Keep container tightly closed, in a cool, well ventilated place. Keep containers upright. Protect containers from damage.
<u>Specific end use(s)</u>	
Specific end use(s)	The identified uses for this product are detailed in Section 1

SECTION 8: Exposure controls and personal protection

Control parameters

Exposure controls

Protective equipment



Appropriate engineering controls	Provide adequate general and local exhaust ventilation. Ensure the ventilation system is regularly maintained and tested. Good general ventilation should be adequate to control worker exposure to airborne contaminants. Observe any occupational exposure limits for the product or ingredients.
Eye/face protection	Unless the assessment indicates a higher degree of protection is required, the following protection should be worn: Tight-fitting safety glasses.
Hand protection	Wear protective gloves. The most suitable glove should be chosen in consultation with the glove supplier/manufacturer, who can provide information about the breakthrough time of the glove material. To protect hands from chemicals, gloves should comply with Australia/New Zealand Standard AS/NZS 2161. Considering the data specified by the glove manufacturer, check during use that the gloves are retaining their protective properties and change them as soon as any deterioration is detected. Frequent changes are recommended.
Other skin and body protection	Wear appropriate clothing to prevent repeated or prolonged skin contact.
Hygiene measures	Wash hands thoroughly after handling. Wash at the end of each work shift and before eating, smoking and using the toilet. Do not eat, drink or smoke when using this product.
Respiratory protection	Ensure all respiratory protective equipment is suitable for its intended use and complies with Australia/New Zealand Standard AS/NZS 1716. Check that the respirator fits tightly and the filter is changed regularly. Gas and combination filter cartridges should comply with Australia/New Zealand Standard AS/NZS 1716. Full face mask respirators with replaceable filter cartridges should comply with Australia/New Zealand Standard AS/NZS 1716. Half mask and quarter mask respirators with replaceable filter cartridges should comply with Australia/New Zealand Standard AS/NZS 1716.

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Environmental exposure controls Keep container tightly sealed when not in use. 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.

SECTION 9: Physical and chemical properties

Information on basic physical and chemical properties

Appearance	Liquid.
Colour	Pale yellow
Odour	Fruity.
Flash point	147°C (Closed cup).
Vapour pressure	1.08 mPa @ 25°C
Relative density	~ 0.924 @ 20°C

SECTION 10: Stability and reactivity

Reactivity	There are no known reactivity hazards associated with this product.
Stability	Stable at normal ambient temperatures and when used as recommended. Stable under the prescribed storage conditions.
Possibility of hazardous reactions	No potentially hazardous reactions known.
Conditions to avoid	There are no known conditions that are likely to result in a hazardous situation.
Materials to avoid	No specific material or group of materials is likely to react with the product to produce a hazardous situation.
Hazardous decomposition products	Does not decompose when used and stored as recommended. Thermal decomposition or combustion products may include the following substances: Carbon dioxide (CO ₂). Carbon monoxide (CO).

SECTION 11: Toxicological information

Information on toxicological effects

Acute toxicity - oral

Notes (oral LD₅₀) LD₅₀ >5050 mg/kg, , Rat

Acute toxicity - dermal

Notes (dermal LD₅₀) LD₅₀ >5050 mg/kg, , Rabbit

Acute toxicity - inhalation

Notes (inhalation LC₅₀) LC₅₀ > 2.38 mg/l, , Rat

Skin corrosion/irritation

Animal data Slightly irritating. (Rabbit)

Serious eye damage/irritation

Serious eye damage/irritation Based on available data the classification criteria are not met.

Respiratory sensitisation

Respiratory sensitisation Based on available data the classification criteria are not met.

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Skin sensitisation

Skin sensitisation Based on available data the classification criteria are not met.

Germ cell mutagenicity

Genotoxicity - in vitro Based on available data the classification criteria are not met.

Carcinogenicity

Carcinogenicity Based on available data the classification criteria are not met.

IARC carcinogenicity None of the ingredients are listed or exempt.

Reproductive toxicity

Reproductive toxicity - fertility Based on available data the classification criteria are not met.

Reproductive toxicity - development Based on available data the classification criteria are not met.

Specific target organ toxicity - single exposure

STOT - single exposure May cause respiratory irritation

Specific target organ toxicity - repeated exposure

STOT - repeated exposure Not classified as a specific target organ toxicant after repeated exposure.

Aspiration hazard

Aspiration hazard Based on available data the classification criteria are not met.

General information

The severity of the symptoms described will vary dependent on the concentration and the length of exposure.

Inhalation

A single exposure may cause the following adverse effects: Headache. Exhaustion and weakness.

Skin Contact

Redness. Irritating to skin.

Eye contact

No specific symptoms known.

Route of entry

Ingestion Inhalation Skin and/or eye contact

Target Organs

Respiratory system, lungs

SECTION 12: Ecological Information

Toxicity

Aquatic Acute 1 - H400 Very toxic to aquatic life.

Acute toxicity - fish

LC₅₀, 96 hours: 4.26 mg/l, Brachydanio rerio (Zebra Fish)

Acute toxicity - aquatic invertebrates

EC₅₀, 48 hours: 0.38 mg/l, Daphnia magna

Persistence and degradability

Persistence and degradability The degradability of the product is not known.

Bioaccumulative potential

Bioaccumulative Potential No data available on bioaccumulation.

Mobility in soil

Mobility No data available.

Results of PBT and vPvB assessment

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Other adverse effects

Other adverse effects None known.

SECTION 13: Disposal considerations

Waste treatment methods

General information

The generation of waste should be minimised or avoided wherever possible. This material and its container must be disposed of in a safe way. When handling waste, the safety precautions applying to handling of the product should be considered. Empty containers or liners may retain some product residues and hence be potentially hazardous.

Disposal methods

Triple or preferably pressure rinse containers before disposal. DO NOT dispose of undiluted chemicals on site. If recycling, replace cap and return clean containers to recycler or designated collection point.

If not recycling, break, crush, or puncture and deliver empty packaging for appropriate disposal to an approved waste management facility. If an approved waste management facility is not available bury the empty packaging 500 mm below the surface in a disposal pit specifically marked and set up for this purpose clear of waterways, desirable vegetation and tree roots, in compliance with relevant Local, State or Territory government regulations. DO NOT burn empty containers or product.

SECTION 14: Transport information

General

Not a dangerous good according to ADG code 7

UN number

3082

UN proper shipping name

ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (s-Methoprene)

Transport hazard class(es)

9

Packing group

III

Environmental hazards

Special precautions for user

SECTION 15: Regulatory information

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

Inventories

Australia - AICS

Not applicable

SECTION 16: Any other relevant information

Training advice

Only trained personnel should use this material.

Revision date

12/12/2016

Revision

2

Supersedes date

12/12/2016

s-Methoprene TG

SDS No.	4788
Hazard statements in full	H315 Causes skin irritation. H400 Very toxic to aquatic life.

This information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process. Such information is, to the best of the company's knowledge and belief, accurate and reliable as of the date indicated. However, no warranty, guarantee or representation is made to its accuracy, reliability or completeness. It is the user's responsibility to satisfy himself as to the suitability of such information for his own particular use.