Telone Training Program

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A-GAS RURAL

Supplier of Telone*, Telone* Blends (C-35, C-60) & Rural InLine Soil Fumigants

This manual has been edited by A-Gas Rural, from material developed by Dow AgroSciences Australia Ltd and other sources

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Introduction

This training course has been put together to provide users of Telone, Telone* Blends and Rural InLine with the skills and knowledge to use them in a manner that works best and is safe for everyone.

Training Content

Training will be made up of:

1. Classroom time where we will work through this manual
2. Practical demonstration where you will need to play a part
3. An assessment for you to show what you have learnt

Assessment

The assessment for this training is made up of 2 parts:

1. Is a written test with multiple choice answers that will be conducted in class. It is an open book test where the answers can be found in this manual or other material given to you. 
   You may ask for help from the trainer where you don’t understand the language or have trouble with reading and writing.

2. Participation in a practical demonstration which shows understanding will also be taken into account.
Chapter 1: Choosing Telone Blends or Rural InLine for soil fumigation

Product stewardship

Telone Blends and Rural InLine Soil Fumigant are all toxic and flammable, but if handled correctly, they can be a very effective pest management tool. If it is used incorrectly, or for the wrong reason you can put your own safety at risk as well as causing concerns for public health and environmental contamination.

This course will ensure that applicators of Telone Blends and Rural InLine are familiar with the benefits and risks associated with their use. We can always improve the way we use fumigants; perhaps the change to Telone Blends or Rural InLine is a good time to review our techniques and see if they meet current best practice.

What are Telone Blends and Rural InLine?

Telone Blends and Rural InLine Soil Fumigants are liquid fumigants for pre-plant treatment of cropland and greenhouse soil that can be used as part of a management program involving rotation, resistant varieties, and other cultural practices designed to alleviate soil borne disease, plant parasitic nematodes, symphylans, wireworms and weeds. Telone Blends and Rural InLine are very hazardous products and must be handled correctly.

Physical Properties

See Safety Data Sheet for details

HOW HAZARDOUS IS TELONE BLENDS AND RURAL INLINE COMPARED WITH OTHER FUMIGANTS?

This is a difficult question to answer simply as the hazard presented by a substance depends upon both the nature of the substance itself and the likelihood and the amount of actual exposure to the substance. For common fumigants, the potential ‘danger’ of each substance based on intrinsic toxicity would be in order as follow:

Phosphine gas > Methyl bromide > Ethylene dibromide (EDB) > Telone Blends > Rural InLine > 1,3-Dichloropropene (Telone) > Metham sodium

However other factors influence the real hazard that these products present to users. For example, methyl bromide (MB) is highly toxic and potentially very hazardous to use because we can’t smell it at levels in the air that have toxic effects. It has been responsible for a number of fatalities around the world. The addition of a small amount of chloropicrin to MB allows us to detect exposures at very low levels and get out of the exposure situation, so the hazard is reduced. In fact a product based on or containing chloropicrin (such as Telone Blends), is easily and rapidly detected before toxic effects begin. The user gets a ‘built in’ warning sign to get away from the exposure. The product Metham sodium is potentially the least toxic of the fumigants in straight form but once put into the soil, it becomes methyl isothiocyanate (methyl mustard oil), which is more toxic than the original product.

There is no simple answer to “which is the more hazardous?” when comparing fumigants. Therefore the only approach to their use must be CARE and ATTENTION on the part of the user. NEVER handle any fumigant without remembering that all are potentially dangerous products. Treat them with the caution they deserve. Always follow label directions.
Selecting the right fumigant for your needs

When selecting the appropriate fumigant product for your needs you will have to consider:

- The soil type you are planning to fumigate
- The soil temperature and moisture content
- The crop type you are going to plant
- The type and level of pest presence you are targeting

<table>
<thead>
<tr>
<th>PRODUCT SELECTION MATRIX</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product</strong></td>
</tr>
<tr>
<td><strong>Rural Telone</strong></td>
</tr>
<tr>
<td><strong>Active Constituent:</strong></td>
</tr>
<tr>
<td><strong>Chloropicrin</strong></td>
</tr>
<tr>
<td><strong>Active Constituent:</strong></td>
</tr>
<tr>
<td><strong>Rural Telone C-35</strong></td>
</tr>
<tr>
<td><strong>Active Constituents:</strong></td>
</tr>
<tr>
<td><strong>Rural InLine</strong></td>
</tr>
<tr>
<td><strong>Active Constituents:</strong></td>
</tr>
<tr>
<td><strong>Rural Telone C-60</strong></td>
</tr>
<tr>
<td><strong>Active Constituents:</strong></td>
</tr>
</tbody>
</table>
PRODUCT SELECTION EXAMPLES

1. John grows Strawberries in Victoria which has medium soils with a higher than normal moisture content, and he needs to control Fusarium, Pythium and Plant Parasitic Nematodes.

John uses Rural Telone C-60 because:
   a) The combination of Telone and Chloropicrin will control his pest problems
   b) The higher Chloropicrin content means that with the higher moisture content in his soil, it will not exceed his targeted plant back time

2. Bob grows Capsicums in a glasshouse in Perth which has rich sandy loam soil and he needs to control a strong Nematode population, and some unknown Fungal Disease.

Bob uses Rural Telone C-35 because:
   a) The higher Telone content will help to eliminate his Nematodes, and the 35% Chloropicrin will control his Fungal Disease.
   b) He finds C-35 is preferable to Rural InLine because it can be applied as a Broadacre application and he is worried about the Nematodes eventually moving from his inner rows to his planting beds.

3. Jane grows Strawberries in Adelaide which has a fine textured clay loam soil and she wants to control Nematode and Disease Pressure in her new plants.

Jane uses Rural InLine because:
   a) She has kept her plastic down and intends to get a second year out of it
   b) She has a suitable injection point in the irrigation at her Strawberry block that is already fitted with a non-return valve; this is an easy option for her.

4. Craig grows Pineapples in Queensland which has a light sandy loam, and he needs to control Nematodes.

Craig uses Rural Telone because:
   a) He is applying it as bed fumigation without plastic
   b) Rural Telone has a slower release rate than chloropicrin mixture
   c) The straight Telone mixture will remain in the light soil long enough to control his nematodes
How do fumigants work?

The Australian Standard AS 2476-2008 describes fumigants as ‘chemicals, which at a particular temperature and pressure can exist in a gaseous state in sufficient concentration and for sufficient time to be lethal to insects or other animals, weeds or other pests’.

Many of the pests we are attempting to control through soil fumigation live in the soil moisture surrounding the mineral and organic particles that make up the soil. To control these pests we must bring the active ingredient of the fumigant into contact with them.

Under ideal conditions, a fumigant is injected into the soil and it quickly converts to a gas that is toxic to the target pests. This gas moves through the air spaces in the soil, dissolving in the film of water that surrounds soil particles. In some cases, it attaches to solid material in the soil. To control a pest with fumigation requires an adequate concentration of fumigant over sufficient time.

Figure 1: Telone Blends and Rural InLine reach target pests by moving through air spaces in the soil and dissolving into the film of water that surrounds soil particles (Dow AgroSciences Ltd).

The important things to remember are:

- Telone Blends are injected directly into the soil and some of it dissolves into the soil water;
- Rural InLine is injected into the soil through irrigation water via drip tape and volatises into a gas which permeates the soil;
- The gas moves through the air spaces in the soil so it can reach the target pests; and
- To kill the pest, Telone Blends and Rural InLine must remain in contact with the pest at a strong enough concentration for an adequate length of time.

The conditions under which you apply Telone Blends and Rural InLine have a lot to do with how successful the treatment will be. Adequate soil preparation and soil moisture conditions at the time of
fumigation and an understanding of the life cycle and habitat of the target pest are critical to the success of fumigation.

Finding information about Telone Blends and Rural InLine

When deciding to use a new fumigant it is essential to develop an understanding of the important features of that product. You will need to change your work practices to match the requirements of this product.

Information about the safe and effective handling of a product is available to you through two (2) important documents:

- The product label (a legal document); and
- The (Material) Safety Data Sheet ((M)SDS); designed to be used in conjunction with the label.

The label and (M)SDS help familiarise the users with the requirements for safe and appropriate use of Telone Blends and Rural InLine. These documents should always be the first place you look for information on handling these products.

Telone Blends and Rural InLine labels

The product labels are legal documents and describe the pests that Telone Blends and Rural InLine are registered to control for use in soil. It also provides information on the safe and effective handling of the product, emergency management and first aid procedures. The label should be affixed to the product container (cylinder or drum).

You must familiarise yourself with the major headings on the product labels and the information they contain, namely:

- DIRECTIONS FOR USE;
- GENERAL INSTRUCTIONS;
- APPLICATION;
- CLEANING EQUIPMENT;
- PRECAUTIONS;
- PROTECTION FOR CROPS, NATIVE AND OTHER TARGET PLANTS;
- PROTECTION OF WILDLIFE, FISH, CRUSTACEANS AND ENVIRONMENT;
- STORAGE AND DISPOSAL;
- SAFETY DIRECTIONS and
- FIRST AID.
Off label use of pesticides
Using Telone Blends or Rural InLine in any manner other than what is described on the product label is illegal.

Your task
Look through the Telone Blends and Rural InLine product labels supplied with this manual and familiarise yourself with the major sections. You will need to refer to these during the course.

Reading the DIRECTIONS FOR USE table

Your task
- Find the DIRECTIONS FOR USE section of the product labels provided with this workbook.
- Which soil types are Telone Blends and Rural InLine registered for use in for Vegetables?
- What is the Broadacre rate (in kg/ha) for Field crops in heavy soils?
- What is the rate for Nursery crops in light soils?
- Name the target pests that Telone Blends and Rural InLine may be used against in Fruit and Nut crops.
- Read the CRITICAL COMMENTS column: How long should you leave soil undisturbed after treatment with Telone Blends in Strawberries?
- Read the CRITICAL COMMENTS column: How long should you leave soil undisturbed after treatment with Rural InLine in Strawberries?
The Safety Data Sheet

The (Material) Safety Data Sheets ((M)SDSs) provides important information on the safe use of Telone Blends and Rural InLine. The manufacturer has produced this information as part of the registration of this product.

Information you will find on the (M)SDS:

- IDENTIFICATION;
- HEALTH HAZARD DATA;
- PRECAUTIONS FOR USE;
- SAFE HANDLING INFORMATION;
- OTHER INFORMATION; and
- CONTACT POINT.

Prior to using Telone Blends or Rural InLine it is essential that you read the information provided in the (M)SDS. You should ask for a (M)SDS when you purchase Blends or Rural InLine. You must make the (M)SDSs available to anyone who is using the Telone Blends or Rural InLine you purchase so they can familiarise themselves with the safety and handling information it contains.

Remember!

The (M)SDSs adds to the information provided on the product labels, however it does not replace it. The product labels should always be your first source of information.

Access to the (Material) Safety Data Sheets

The (M)SDSs are an important part of letting staff who are using fumigants, or who could be affected by the use of fumigants, know about the hazards of fumigation with Telone Blends and Rural InLine. Staff need to have easy access to the (M)SDSs and must be trained in using them.

Workplaces should have collections of (M)SDSs in their work areas (e.g. the packing or machinery shed) so that staff, who could be exposed to a hazardous substance, can understand more about its health effects.
Your task

Find the (M)SDSs provided with this course:
Familiarise yourself with the major headings and list them below:

Check the date on the (M)SDSs
Telone Blends:
Rural InLine:

Do the (M)SDSs match the product descriptions on the product labels (including the manufacturer and product formulation information)?

YES / NO
Risk management procedures

The active constituents (active ingredients) in Telone Blends and Rural InLine (1,3-Dichloropropene and Chloropicrin) are both hazardous substances. Telone Blends and Rural InLine (the hazards) have the potential to harm human health. Risk is the likelihood that injury or illness might result because of the hazards.

Work Health and Safety Legislation in all states requires employers to perform a risk assessment for any hazardous substance used in their workplace. This assessment must occur prior to the first use of that substance in the workplace. (See example below)

<table>
<thead>
<tr>
<th>HAZARD</th>
<th>RISK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual Handling</td>
<td>The likelihood that a worker might suffer back strain from manually lifting heavy or awkward objects</td>
</tr>
</tbody>
</table>

Before using Telone Blends or Rural InLine you will have to conduct a risk assessment and consider appropriate risk controls.

The role of a risk assessment is to:

- Determine whether there is a risk to the health of staff involved in the fumigation process; and
- Put appropriate controls in place to eliminate or reduce that risk.

Through the risk assessment process it is possible to establish:

- The nature of any risks at each stage of the process;
- How serious the risk is; and
- Who could be affected?

Risk Assessment

Irrespective of the type of risk assessment you are undertaking you apply the SAFER principles of risk management.

- **See it**, identify hazards to health and safety relevant to the task
- **Assess** the nature and degree of risk associated with the identified hazards
- **Fix it**, take appropriate actions to manage and control the risk
- **Evaluate it**, how effective are the actions taken to manage the hazards and control the risks
- **Record**, the action you have taken or plan to take

How do I conduct a risk assessment?

The following overview provides a series of steps that will help you conduct a risk assessment for the application of Telone Blends and Rural InLine.
1. **Who should carry out the assessment?**

If you are the employer or staff involved in fumigation (or self-employed) it is your responsibility to perform the assessment. It is important that the people involved in the assessment have a practical understanding of each stage of the process. Involve your fumigation staff in the process, as their experience will be valuable.

**Remember:** Employers have an obligation to ensure a safe workplace, which includes hazard management and risk reduction procedures being implemented and recorded. Employees have an obligation that they will do nothing to harm themselves or others in the workplace. The requirement includes wearing PPE that is provided by the employer.

2. **Collect and review information about the hazardous substance**

Find out about health hazards, precautions for use and safe handling requirements for Telone Blends or Rural InLine. Consider how the use of this product could affect workers health.

Consider information on:

- The routes of exposure to Telone Blends or Rural InLine (i.e. inhalation and absorption through the skin and eyes);
- the form in which Telone Blends or Rural InLine will be present at each stage of the process (i.e. liquid, gas);
- physical properties of Blends or Rural InLine (flammable, toxic, volatile); and
- Potential health effects associated with the various forms of exposure.

The product labels and (M)SDSs will contain the majority of information to assist you in assessing the potential for exposure and associated risks for each stage of the process.

3. **Divide the process into individual steps and identify risks**

The next stage is to break the entire process of fumigation down into individual steps. This should span the entire process of fumigation including storing the product, preparation of the product and equipment, application, ventilation, re-entry and clean up.

You need to consider any people who may be affected as a result of the application of Telone Blends or Rural InLine (e.g. non-fumigation staff involved in ventilation).

Once you have listed the individual steps consider the following issues for each one:

- Under what circumstances could exposure to Telone Blends or Rural InLine occur during this step?
- Who could be exposed under each circumstance?
- How often is exposure likely to occur?
- What is the level of exposure for each circumstance?

**NOTE!** PPE must always be used in accordance with the conditions set out on the product label.
4. Assessing Risk

Where a hazard has been identified then an assessment of the risk associated with the problem must be made; that is ASSESS IT! The degree of risk is a combination of the potential severity and the frequency of exposure to that hazard. The table below provides a framework to assist in assessing risk.

**Table 1: Risk Assessment chart using likelihood / consequence of risk**

<table>
<thead>
<tr>
<th>CONSEQUENCES: How severely could it hurt someone?</th>
<th>LIKELIHOOD: How likely is it to hurt someone?</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXTREME death, permanent disablement</td>
<td>VERY LIKELY</td>
</tr>
<tr>
<td>MAJOR serious bodily injury</td>
<td>H</td>
</tr>
<tr>
<td>MODERATE casualty (outpatient) treatment</td>
<td>H</td>
</tr>
<tr>
<td>MINOR first aid only, no lost time</td>
<td>M</td>
</tr>
</tbody>
</table>

**Table 2: Action required for each risk class established on Table 1**

<table>
<thead>
<tr>
<th>Risk Class</th>
<th>Class Definition</th>
<th>Action Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>H</td>
<td>High</td>
<td>Act Now – stop task until hazard is removed</td>
</tr>
<tr>
<td>M</td>
<td>Medium</td>
<td>Act As Soon As Possible – don’t undertake task or use equipment until hazard is removed</td>
</tr>
<tr>
<td>L</td>
<td>Low</td>
<td>Plan risk reduction</td>
</tr>
<tr>
<td>N</td>
<td>Negligible</td>
<td>OK for now – review if equipment / people / materials / work methods change</td>
</tr>
</tbody>
</table>

**Table 3: Assessing ‘frequency of occurrence’ of a risk**

<table>
<thead>
<tr>
<th>FREQUENCY OF OCCURRENCE (LIKELIHOOD)</th>
<th>DESCRIPTION</th>
<th>NEAREST NUMERICAL FREQUENCY FOR GUIDANCE (events per year)</th>
</tr>
</thead>
</table>
| VERY LIKELY                         | Could happen frequently  
                                        Once per week or more frequently | 50 or greater |
| LIKELY                              | Could happen often  
                                        On average once per month | 10 |
| OCCASIONAL                          | Could happen occasionally  
                                        On average once per year | 1 |
| UNLIKELY                            | Could happen but rare  
                                        Typically once every 10 years | 0.1 |
| VERY UNLIKELY                       | Remote possibility  
                                        Typically once every hundred years or less | 0.01 |
**Table 4: Pyramid of control processes**

<table>
<thead>
<tr>
<th>Control method</th>
<th>Explanation</th>
<th>Your example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elimination</td>
<td>Completely removing the hazard by using a safer process or product</td>
<td></td>
</tr>
<tr>
<td>Substitution</td>
<td>Reducing a hazardous item of equipment, process or substance with a less hazardous one</td>
<td></td>
</tr>
<tr>
<td>Isolation</td>
<td>Separating people from the hazardous substance by a barrier or distance</td>
<td></td>
</tr>
<tr>
<td>Engineering controls</td>
<td>Redesigning or changing equipment, processes or materials to eliminate the hazard</td>
<td></td>
</tr>
<tr>
<td>Administrative controls</td>
<td>Changing your work practices or routines to reduce the exposure to, or risk of, a hazard</td>
<td></td>
</tr>
<tr>
<td>Personal Protective Equipment (PPE)</td>
<td>Using PPE to minimise the risk of exposure to hazardous substances or environments*</td>
<td></td>
</tr>
</tbody>
</table>

**LEVEL 1**
Eliminate the hazard

**LEVEL 2**
Substitute with something safer
Isolate the hazard from people
Reduce the risk with engineering controls

**LEVEL 3**
Reduce exposure using administrative controls
Use Personal Protective Equipment

*Note! PPE must always be used in accordance with the conditions set out on the product label.*
Example of part of a risk assessment for Telone Blends

**Hazardous substance:** 1,3-Dichloropropene, Chloropicrin

**Product name:** Telone Blends

**Form:** Liquid volatising to a gas on injection

**Active constituent:** 1,3-Dichloropropene

**Major routes of exposure:** Skin contact or eye contact with product leaking directly from equipment and inhalation of gas leaking from soil or volatilising from spilled liquid.

**Description of process:**

The operator adjusts the location of the rig and drops tynes into the bed to allow other fumigation staff to dig in plastic. Plastic is dug in at the beginning of the row by fumigation staff working at the rear of the equipment. Operator opens the fumigant supply and commences the run down the row.

**Table 6: Example of risk assessment process for digging plastic in at the beginning of a row**

<table>
<thead>
<tr>
<th>Stage of operation</th>
<th>Who is at risk?</th>
<th>Route of exposure</th>
<th>Controls</th>
<th>Other considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dig in plastic at beginning of row</td>
<td>Operator and fumigation staff digging in plastic (working at rear of rig)</td>
<td>Skin contact</td>
<td><strong>Engineering</strong></td>
<td>Ensure adequate flushing of the rig occurs at the end of the previous row</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inhalation</td>
<td>Use flow shut-off devices to reduce leakage from injection tynes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Eye contact</td>
<td><strong>PPE</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Follow label PPE requirements</td>
<td></td>
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<td>Field workers</td>
<td>Inhalation</td>
<td><strong>Administrative</strong></td>
<td>Consider wind direction during fumigation. A moderate breeze may reduce the risk in up-wind zones</td>
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<td>Do not roster people to work in fumigation area during fumigation period</td>
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<td><strong>PPE</strong></td>
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<td>Follow label PPE requirements</td>
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Example of part of a risk assessment for Rural InLine

Hazardous substance: 1,3-Dichloropropene, Chloropicrin

Product name: Rural InLine

Form: Liquid volatizing to a gas on release from drip tape

Active constituent: 1,3-Dichloropropene

Major routes of exposure: Skin contact or eye contact with product leaking directly from equipment and inhalation of fumigant leaking from greenhouse or plastic sheeting.

Description of process:

The operator sets up the rig and connects to the irrigation. The water supply is turned on and the Operator opens the fumigant supply and commences injection into the system.

Table 7: Example of risk assessment process for connecting and starting injection unit

<table>
<thead>
<tr>
<th>Stage of operation</th>
<th>Who is at risk?</th>
<th>Route of exposure</th>
<th>Controls</th>
<th>Other considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connecting and starting injection unit</td>
<td>Operator</td>
<td>Skin contact</td>
<td>Engineering</td>
<td>Ensure lines &amp; connections inspected prior to commencement</td>
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<td></td>
<td>Inhalation</td>
<td>Correctly installed connections</td>
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<td>Eye contact</td>
<td>Sealed application system</td>
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<td>PPE</td>
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<td>Follow label PPE requirements</td>
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<td>Field workers</td>
<td>Inhalation</td>
<td>Administrative</td>
<td>Do not roster people to work in fumigation area during fumigation period</td>
<td>Consider wind direction during fumigation. A moderate breeze may reduce the risk in up-wind zones</td>
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<td>Follow label PPE requirements</td>
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Your task
Use the tables on the following pages to complete a risk assessment for your own use of Telone Blends or Rural InLine
### Choosing Telone Blends or Rural InLine

<table>
<thead>
<tr>
<th>Product:</th>
<th>Stage of operation</th>
<th>Who is at risk?</th>
<th>Route of exposure</th>
<th>Controls</th>
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Chapter 2: Preparing the site for fumigation with Telone Blends and Rural Inline

Telone Blends and Rural InLine should only be applied when climatic and soil conditions are suitable. A site inspection prior to fumigation will help you to assess if a site is ready for fumigation.

During your site inspection consider:

- The suitability of the soil;
- Environmental conditions;
- Weather conditions;
- Crop requirements;
- Soil sealing methods; and
- Hazards associated with the site of fumigation.

For the grower

What does the label say?

Before fumigation, soil sampling for the type and number of pests present is recommended. In fields where pre-treatment soil samples indicate the presence of high population levels of soil-borne pathogens, a successful fumigation cannot be expected to eradicate entire populations. Therefore, post-treatment sampling is also recommended to determine the need for additional pest management practices.

See Telone Blends and Rural InLine label section: General Instructions

Pre-fumigation testing

The best method of identifying and quantifying the pests present in your soils before fumigation is to use a professional diagnostic service. The method you use for sampling will depend on which pests you are testing for. Ask a diagnostic service about their requirements for your situation.

(Refer to Appendix 2, page 79 – Soil Sampling Procedure for Plant Parasitic Nematode)

Post-fumigation testing

If testing before fumigation identifies plant parasitic nematodes in your soil, it may be valuable to track the effect of fumigation on this pest. Post fumigation testing (testing after fumigation) of the soils will allow you to assess if the pest was controlled adequately, and if there is a need for additional management practices.
Soil tilth

The preparation (e.g. cultivation) of your soil before fumigation will have a major impact on the effectiveness of the Telone Blends application. Well prepared soils are essential to maximise the movement of the fumigant through the soil from the point of injection.

When preparing your soil for fumigation ensure that the following conditions are met:

- The soil should be free of clods – Clods can prevent effective soil sealing and reduce effectiveness of Telone Blends;
- Plant and crop residues (organic matter) – Little or no organic matter should be present on the soil surface.
- Compaction – Compacted soil layers within the desired treatment zone should be fractured before or during application of the fumigant.
- Depth of cultivation – Be sure the soil is suitably prepared to the full depth that you wish to have treated.

Crop requirements

Fumigation with Telone Blends or Rural InLine can have an impact on nutrient levels in the soil. It is important to consider your fertiliser program before fumigation and assess if changes need to be made to avoid any toxicity problems and deficiencies that may result.

Fumigation may temporarily raise the level of ammonium, nitrogen and soluble salts in the soil. This is most likely to occur when:

- Heavy rates of fertiliser and fumigation are applied; and/or
- Soils are cold, wet, acid or high in organic matter

Some specific situations are:

- To avoid ammonia injury or nitrate starvation (or both) to crops grown in high organic soils, DO NOT use fertilisers containing ammonium salts and use only fertilisers containing nitrates, until after the crop is well established and the soil temperature is above 18°C. In mineral soils, do not apply more than 2/3 of the nitrogen requirements from fertilisers containing ammonium salts until the crop is well established and the soil temperature is well above 18°C.
- Liming highly acid soils before fumigation stimulates nitrification and reduces the possibility of ammonia toxicity.
- Certain nursery crops such as citrus seedlings and vegetable crops such as cauliflower have shown evidence of phosphorous deficiency following fumigation. To avoid this possible effect, additional phosphate fertiliser (foliar applied) is recommended where experience indicates a deficiency may occur.
For the grower and/or applicator

Suitable soil and environmental conditions for Telone Blends and Rural InLine

Best results are generally obtained when the conditions favour the rapid diffusion of Telone Blends or Rural InLine through the soil.

Successful fumigation requires a favourable balance of:

- Soil tilth;
- Soil moisture; and
- Soil temperature.

Soil Type

Typically Light Soils, such as coarse textured sands, sandy loams and loams, require a lower rate than heavier soils.

Heavy soils, such as fine textured clay loams, will require a longer plant back period.

(Refer to Appendix 3, page 81 – Assessing the soil)

The DIRECTIONS FOR USE for Telone Blends and Rural InLine has a column for SOIL TYPE. For Fruit and Nut crops including Strawberries all soil types are suitable.

What does the label say?

See Telone Blends and Rural InLine product label sections: APPLICATION – Soil Conditions

Your task

Check the label for optimum soil conditions. What are they?

_____________________________________________________________________________
_____________________________________________________________________________
_____________________________________________________________________________
_____________________________________________________________________________

Soil moisture and Telone Blends

The management of soil moisture levels is an important step prior to fumigation with Telone Blends. The soil should be neither too wet nor too dry. Soil moisture levels can affect the rate of breakdown of Telone Blends and its passage through the soil pores (airspace between the soil particles) resulting in variable results from the treatment. The soil must be moist from 5cm below the soil surface to at least 30cm deep. This can be determined by the ‘feel method’, which is provided in Appendix 3.

- If there is insufficient moisture at 5-15cm depth, the soil moisture must be adjusted
Soil temperature
The soil temperature where Telone Blends are injected or Rural InLine is required to penetrate has an effect on the speed of its movement within the soil. To ensure effective application the soil temperature in the zone where Blends are injected or Rural InLine is required to penetrate should be between 15-25°C.

Soil temperature can be tested with a soil thermometer prior to fumigation. Readings must be taken at a depth of 15cm.

- **Optimal soil temperatures for the application of Telone Blends and Rural InLine are between 15°C and 25°C**
- **Do not use Telone Blends or Rural InLine when the soil temperature is below 5°C or above 27°C**

Weather conditions
When planning a fumigation task, consideration should be given to the weather conditions on the site at the time of the application.

These include:
- Wind speed; and
- Wind direction.

They can impact on your fumigation in two ways. Strong winds may disturb sealing of the soil post-fumigation. If there is threat that the tarps will be lost or damaged during fumigation, the activity should be delayed to avoid loss of product to the atmosphere.

The direction of wind during fumigation should also be considered if there are neighbours or other workers nearby. Do not fumigate if there is a possibility that others down-wind could be affected by fumigant vapour.

Sealing the soil
The soil should be sealed immediately after the placement of Telone Blends to maximise the effectiveness of the treatment and to minimise atmospheric contamination from fumigant gases exiting the soil too quickly. The method of sealing you use will depend on industry practices and your application equipment.

The benefit of sealing is that it maintains a more uniform and higher concentration of Telone Blends in the soil for a longer period of time. This makes the fumigant more effective.

Methods of sealing the soil when using Telone Blends
When Telone Blends are injected into the soil through the use of tynes the passage of the tyne (or chisel) through the soil will result in a ‘trace’ or weak area through which gas can escape. This can result in a reduced dose of fumigant between the tynes.
Shallow cultivation and compaction of the soil surface after injection can reduce the negative effects of the tyne trace. The addition of a layer of plastic film to cover fumigated soil reduces the speed at which the fumigant escapes.

When Telone Blends are placed in raised beds the nearest soil/interface must be at least 30cm away.

When fumigating with Telone Blends the soil is sealed by:

- applying unperforated plastic film, such as polyethylene, over the entire area (this is the most preferable method when combined with the removal of the tyne traces) \textit{Note! Sealing with plastic does not remove the need to eliminate the tyne traces}
- compacting the soil surface to further retard the rate of fumigant loss (i.e. with a ring roller or roller with cultivation equipment)

\textit{Note! Compaction does not remove the tyne traces}

Row treatments into pre-formed beds must be sealed by disrupting the tyne trace using press sealers, ring rollers or by reforming the beds and following with such equipment.

\textit{Note! Fumigants can pass through plastic!}

Low density polyethylene (LDPE) plastics provide less of a barrier to the movement of fumigants than virtually impermeable films (VIFs).

\textbf{Remember!}

\textit{Ideally, sealing of the surface should occur immediately after the placement of Telone Blends. Your equipment should be designed to incorporate the placement of the fumigant and sealing the soil (after placement) in one pass.}

\textit{It is your responsibility to follow the label recommendations on sealing the soil. Check your equipment and methods prior to fumigation.}

\textit{See Telone Blends label section: APPLICATION: Sealing the Soil after Application.}

\textbf{Sealing the soil when using Rural InLine}

Use of a plastic tarp as mulch to cover beds during and after fumigation with Rural InLine has shown to improve the effectiveness of drip applications.

When preparing for fumigation with Rural InLine:

- \textbf{New sites} should be tilled and levelled, application of any herbicides should follow and the soil should be sealed with a roller or water to prevent it from drying out, and then lay the plastic tarp seal.

- For \textbf{previously drip irrigated sites}, the previous crop and weeds need to be destroyed and/or removed, all the irrigation leaks must be repaired and all drip tape must be working properly, and the beds must be pre-wetted.
Hazards associated with the site of fumigation

In Chapter 1 we looked at the process of conducting a risk assessment to identify and control health and safety risks from fumigation. Now we will look at some of the issues relating to the site of the fumigation task. Use the comments in this section to help you develop your risk assessment plan.

Remember!

*If you can think of other issues about the site that may present a health and safety risk, include them in your risk assessment. The information in this section is to help you think about your situation. It does not represent every possible risk.*

Geography of the site

The fumigants you use are not the only thing that will pose a risk to health and safety on the site of fumigation. Consider what effects the geography may have.

- **If you are using Telone Blends and you are fumigating on a slope?** – If there is a risk of roll-over on the site it may require you to look at the equipment you are using and the direction you travel over the site of fumigation.
- **Is the site isolated?** – What would happen if someone did have an accident? How far is the nearest help?

Glasshouses and polyhouses

Glasshouses and polyhouses are confined spaces in which chemicals can reach high concentrations unless appropriately ventilated. If your fumigation task is in an enclosed space such as this consider the risks involved.

- **For Telone Blends: Is the site of fumigation properly ventilated?** – DO NOT use in enclosed greenhouses or other enclosed areas. Telone Blends can only be used in large greenhouses with both ends removed to allow ventilation.
- **For Rural InLine: Is the site of the fumigation properly sealed?** – The greenhouse is properly sealed and unauthorised entry is prevented.
- **Could fumigation affect other desirable plants?** – DO NOT apply within 1.5 meters of desirable plants or living trees. Care should be taken in greenhouses to avoid off-target damage.

Non-fumigation personnel

Your risk assessment must consider fumigation staff as well as others present on the site.

- **Could anyone else be affected by the fumigation task?** – Workers within the vicinity of the treatment area should wear appropriate protection (see Chapter 8: Use and maintenance of PPE). Also, consider if there is anybody on adjoining properties that could be affected.
Neighbouring Sites

Your risk assessment must consider people on other sites when their closeness puts them at risk e.g. market gardens.

- Could anyone working, or living, on surrounding sites be affected by the fumigation task? – Residents, owners and workers on surrounding sites need to be alerted of plans to fumigate and risk of exposure to them needs to be included when planning to fumigate. Consider:
  - Are you fumigating near the boundary to your neighbour’s property and they live, or will be working near that boundary?
  - Will there be a wind blowing towards your neighbours on the day you plan to fumigate that may carry fumes in their direction?
  - Have you put signs out to warn anyone approaching the fumigation site of the presence of DANGER?

Environmental issues

As a user of Telone Blends or Rural InLine you need to make sure that fumigation does not impact on other crops, underground water courses, or native and non-target plants. You also have a duty to protect wildlife, fish, crustaceans and the environment from contamination with Telone Blends or Rural InLine.

- Are there other plants nearby? – Remember that Telone Blends and Rural InLine can have an effect on plants within 1.5 meters of the fumigation site.

- Is there a possibility of environmental damage? – Do not apply Telone Blends or Rural InLine soil fumigant within 5 meters of aquatic environments such as rivers, streams, marshes and other water bodies. Do not contaminate streams, rivers or waterways with the chemical or used containers.

- Is there a water source nearby? – The 1,3-dichloropropene in Telone Blends and Rural InLine is known to move through soil and under certain conditions has the potential to reach ground water. Application in areas where soil is permeable and ground water is near the surface could result in ground water contamination for a period of time after treatment. Do not apply within 30 meters of any well used for drinkable water.

Your task

Discuss or note down potential dangers with your own site.
Notes:

Preparing the site for fumigation with Telone Blends & Rural Inline
Chapter 3: Setting up the site

Appropriate use of Telone Blends and Rural InLine goes further than just applying it under label conditions. This chapter looks at the basic notification and handling requirements for Telone Blends and Rural InLine.

Notification requirements and security, before, during and after fumigation

Prior to fumigation you have a responsibility to warn anyone who could be affected by the process about the risks associated with fumigation. This should include other workers, visitors, neighbours, or persons who could possibly be exposed to fumigants as a part of their activities on, or near the fumigation site.

Others not directly involved in the fumigation task should be notified of:

- The risk of entry into the area being fumigated; and
- The personal protective equipment (PPE) requirements for entry into the areas being fumigated.

During fumigation only appropriately trained staff directly involved in the process should be within the area around the application rig where splashes or exposure may occur, to vapour or liquid spills. Anyone working in this area must be using PPE appropriate to the task (see Chapter 8: Use and maintenance of personal protective equipment).

Warning signs

Prior to commencing the fumigation task warning signs must be erected to inform others of the hazards associated with the product. Signs or placards must be prominently shown at all approaches to the fumigation site.

Warning signs must state:

- ‘DANGER KEEP OUT – POISONOUS GAS – FUMIGATION IN PROGRESS – KEEP AWAY’
- These signs should also include contractor’s name and address plus ‘Poisons Information Centre Tel. 13 11 26’

These signs must be set up before commencing fumigation and remain in place while there is a risk of exposure to fumigants either from application, spills or emissions during the fumigation interval.

Remember!

Place warning signs on all possible approaches to the site of fumigation. Don’t assume that everyone will enter the site by the same path as you do! Warning notices should be placed at a distance from the site that will allow someone to read the warning without getting close enough to be affected by the treatment.
Figure 2: Example of information to be included on fumigation warning signs.

DANGER – KEEP OUT!
POISONOUS GAS

FUMIGATION IN PROGRESS
KEEP AWAY

Bloggs & Son Fumigation
30 John St, Smithtown

For poison information call:
Poisons Information centre 131126

Your task
On a plan of your property and its locality, showing roads, creeks, green houses and houses identify where warning signs should be placed.
Transport and handling of fumigants

Safe use of fumigants begins when you first obtain the product. Federal and State laws will dictate the way you transport, store and apply the Telone Blends and Rural InLine and you need to be aware of your responsibilities at each stage.

Dangerous Goods Laws

Telone Blends and Rural InLine are designated as Dangerous Goods, which means there are laws covering the transport, storage and handling of these products. Dangerous Goods Laws are regulated by each state and territory but is based on the Australian Dangerous Goods (ADG) Code (7th Edition) which sets out technical requirements and guidelines for the transport of dangerous goods by road and rail.

To learn more about your requirements under your state’s Dangerous Goods Laws contact your state WHS Authority. Contact details are provided in Appendix 6.

What Dangerous Goods Class are Telone Blends and Rural InLine?

In general, the aim of Dangerous Goods Laws is to identify aspects of a product that could present a physical danger in an accident. The ADG Code divides products into risk categories (e.g. Toxic, Flammable, Explosive, etc.), which are given distinctive marking to assist people in identifying immediate risks associated with the product.

Telone Blends are listed as:

- A toxic substance (Class 6.1 Dangerous Goods)
- A flammable liquid (Sub Risk Class 3)

This means Telone Blends are toxic and flammable:

- Avoid inhalation, and exposure to eyes and skin
- Avoid exposure of this product to naked flames or sources of ignition
- Put out all pilot lights and glowing heating units
- Store the product away from sources of ignition

Rural InLine is listed as:

- A toxic substance (Class 6.1 Dangerous Goods)
- A flammable liquid (Sub Risk Class 3)
- A corrosive liquid (Sub Risk Class 8)

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Handling Telone Blend cylinders and Rural InLine drums
Telone Blend cylinders and Rural InLine drums must be handled in such a way as to avoid damage or accidental release of the fumigant. You are responsible for the product at all times that it is in your possession.

Telone Blend cylinders and Rural InLine drums must be transported, handled and stored correctly to prevent the risk of spills or other accidents. This includes full, partly used cylinders and drums and empty cylinders. The Telone Blends and Rural InLine labels note some specific handling requirements. Be sure that you and anyone else who handles the product are aware of these responsibilities.

This means Rural InLine is toxic, flammable and corrosive:
- Avoid inhalation, and exposure to eyes and skin
- Avoid exposure of this product to naked flames or sources of ignition
- Put out all pilot lights and glowing heating units
- Store the product away from sources of ignition
- Store away from incompatible materials

Extra care should be taken with the valves of Telone Blends cylinders. Damage to these could result in accidental release of the product or a poor seal when attaching the cylinder to fumigation equipment.

In general cylinders should be chained upright when in storage or transport to avoid damage from a fall. Valves should always be kept fully closed during transport and storage of Telone Blend cylinders.

Storage of Telone Blends and Rural InLine
Telone Blend cylinders and Rural InLine drums must be stored safely and securely. Appropriate storage reduces the risk of accident, environmental pollution or damage to the product. The product labels list...
the minimum conditions that your store must provide. It is important that you check with your state authorities to see if these conditions meet your state requirements.

Your storage procedures must meet the following minimum conditions:

- Keep cylinders and drums upright
- The store must be kept locked (and child proof)
- Store away from dwellings
- Store in the closed, original container
- Keep the store cool and well-ventilated
- Do not store for prolonged periods in direct sunlight
- Store away from children, animals, food, feedstuffs, seed and fertilisers; and
- **DO NOT** stockpile Telone Blends or Rural InLine. Only store enough product for the current season fumigation requirements.

*Note! Check that your store meets chemical storage regulations in your state.*

**Used Telone Blends cylinders must be securely stored after the completion of a fumigation task.**

When you have finished a fumigation task you must:

- Fully drain the distribution system on your equipment; and
- close all valves, re-cap them and return to point of supply for refill or storage

**Used Rural InLine drums must be securely stored after the completion of a fumigation task.**

When you have finished a fumigation task you must:

- Flush injection lines and drip tape until clear of product residue;
- Ensure the drum is flushed clean;
- Remove all hoses and connections from the drum; and
- Store safely until drumMuster disposal can be arranged
Your task

Draw a plan of your fumigant store and describe any safety features. Make sure you include any nearby buildings in your plan.

Look at the storage conditions for Telone Blends and Rural InLine. How does your current method of storage need to change to meet these minimum requirements?
Notes:

Setting up the site
Chapter 4: Applying Telone Blends

The method you use to fumigate with Telone Blends will vary depending on crop requirements and the style of equipment in use. This product can be distributed in broad acre or row treatments with equipment that may differ in design depending on the usage. Effective placement of Telone Blends in the soil is critical to the success of the fumigation task.

Before applying Telone Blends consider the following issues:

- You must set up the equipment to meet label requirements
- The application equipment must be calibrated
- Telone Blends must be applied safely and effectively
- Cleaning and maintenance of application equipment; and
- Hazards associated with applying Telone Blends must be addressed.

Setting up fumigation equipment

Fumigation equipment needs to be specifically designed for applying Telone Blends or to be easily adjustable to suit the application needs of this product. The equipment also needs to be calibrated to ensure you are applying the product within recommended rates.

Application equipment for Telone Blends will vary depending on your specific requirements. The capacity of the equipment to provide appropriate placement of the fumigant is critical to its effectiveness.

Setting up the equipment requires:

- Maintaining a ‘closed system’ for application
- Ensuring the equipment is constructed of compatible materials; and
- Placement of the product to suit the cropping / fumigation style.

When applying Telone Blends through a gas pressurised system you must use nitrogen to pressurise the system. DO NOT use compressed air!

Equipment design: providing a ‘closed system’

Telone Blends are hazardous products and could cause serious injury or illness if handled incorrectly. The primary aim when handling Telone Blends is to eliminate the possibility of accidental escape of the fumigant from the cylinder, application equipment or the treated soil: this can be done by handling this product through a ‘closed system’.
The closed system provides an application environment where Telone Blends are safely contained by the application equipment at each stage of the application process. This achieved by using:

- Leak-proof cylinders which contain the product during storage and transport
- Leak-proof application equipment which pressurises, transfers and meters the flow of the product; and
- Soil injection, which is followed immediately by a process that seals the fumigant in the soil being treated.

Figure 3: Schematic diagram of closed system for the placement of Telone Blends through tyne equipment

**Materials compatible with Telone Blends**

You must ensure that your application equipment is constructed of material suitable for use with Telone Blends. Some materials react with this product and under some conditions can produce hazardous decomposition products. Appropriate materials for use with Telone Blends are shown below.

**Materials compatible with Telone Blends:**

**Hoses, pipes and transfer lines:**
- Nylon; cross-linked polyethylene; high-density-polyethylene; polypropylene; steel; copper; low density polyethylene; Teflon; stainless steel; brass

**Seals, gaskets and packing:**
- Teflon; nylon; polypropylene

**Valves and fittings:**
- Stainless steel; brass; copper; polypropylene; steel; cast iron, nylon; cross-linked high-density polyethylene.
Broad acre application
The equipment used for broad acre fumigation should be designed to allow the deepest application of the fumigant and provide best soil seal under existing conditions.

The tyne spacing (e.g. the distance between outlets that inject the fumigant) will differ depending on the equipment you are using.

- A tyne spacing of 30cm is recommended
- The tyne spacing may be up to 1 ½ times the application depth, but in general should equal the application depth (e.g. for an application depth of 30cm the tyne spacing could be 30-40cm)
- The tynes may be staggered to reduce the ‘bulldozing effect’ in heavier soils as long as the lateral distance between injection points in the soil does not alter from those recommended.

Figure 4: Detail of tyne spacing and alignment (i.e. off-set tynes) on broad acre rig.

What does the label say?

DO NOT use containers, pumps or other transfer equipment made of aluminium, magnesium or their alloys as under certain conditions this product may be severely corrosive to such metals.

See Telone Blends label section: Other Precautions
Strip fumigation

The equipment used for strip fumigation must be able to place the fumigant at an adequate spacing to treat the planting area. However, the outlet on the tyne must be placed at least 30cm from the nearest soil/air interface i.e. where the soil meets the air.

The soil/air interface is the nearest point where the fumigant could exit to the atmosphere from the point where it is placed (injected) into the soil. This could be in the furrow for multiple tyne applications or the top of the beds for single tyne applications (see figure 7).

The number and spacing of tynes for strip fumigation will depend on the width of the planting row. As with broad acre application the soil must be adequately sealed immediately after placement of the fumigant (see Sealing the soil, Chapter 2) e.g. disrupting the tyne trace coupled with compaction or plastic tarps.

Figure 5: Details of the tyne depth and spacing on a Telone fumigation rig

Figure 6: Photo showing compaction roller following tynes to seal the soil after fumigant placement

Set-up requirements for strip fumigation equipment (for row spacing greater than 60cm):

- Use tyne equipment to treat a band of soil where the crop is to be planted.
  
  **Note!** To prevent crop establishment problems caused by improper seed-to-soil contact or improper seeding depth, do not place the seed directly over the furrow left by the applicator tyne(s).

- When multiple tynes per plant row are used, space the tynes (fumigant outlets) 20-30cm.

- Regardless of the number or spacing of tynes used the fumigant must be placed at least 30cm from the nearest soil/air interface.
Calibration for tyne application

The method of calibrating application equipment will change depending on the type of equipment you use. Any application method that accurately and safely ensures a proper rate of application is acceptable.

The application rate of Telone Blends you have chosen for your situation is regulated through a series of variables that are set by the operator during the process of calibration:

- **Tyne spacing** – allows for variation in individual rigs that may take into account the soil conditions and style of cropping. The spacing you choose must be within label recommendations (see Telone Blends label section: Directions for Use);

- **Operating speed** – is set during a test run of the equipment on the site of fumigation. Choose an operating speed in the mid-range of what is possible to allow for minor alterations during calibration (e.g. a slight increase in speed may reduce your operating pressure to within acceptable limits);

- **Operating pressure** – by adjusting the line pressure with the transfer gas (Nitrogen). This parameter is limited by the capacity of the nitrogen source to pressurise the system and the safe operating capacity of the lines that carry the nitrogen and/or Telone Blends;

- **Metering system** – this will commonly use an orifice (e.g. orifice plate or Telone Tubing) that will provide known flow rate based of the operating pressure at the orifice. Variation is possible through the choice of the orifice diameter you fit in-line (e.g. orifice plates / adjustable flow meter or Telone tubing).

When establishing these parameters it is important to remember that they must be within normal operating capacity of the equipment. Two out of three of these parameters (operating pressure and application speed) are generally fixed (with minor adjustment possible) so the greatest variability is provided by the metering system.
To calibrate your equipment the first step is to establish a rate suited to your situation. To do this you will need to consult the table in the DIRECTIONS FOR USE section of the Telone Blends product label.

The rate of application you choose for Telone Blends will depend on:

- The crop that is proposed for the site;
- Degree of pest incidence;
- Environmental conditions at the time of application.

Remember!

Always check the label to ensure you are using Telone Blends within the range of rates shown for that situation.

- Using lower rates than the minimum stated may reduce the effectiveness of the treatment.
- Use of higher rates than those stated is illegal.

Telone Blends calibration exercise

Step 1

Establish an application rate:

Read the DIRECTIONS FOR USE table on the Telone Blends product label. Is the rate listed below suitable for use as a Broad acre application rate for Strawberries in All Soil Types?

470 – 940 kg/ha  (350 – 700) L/ha  

YES / NO

Step 2

Determine the flow rate for your fumigation task:

ML/100m of row/out = 0.1 x Broadacre rate in L/ha x outlet spacing in cm.

For example, the application rate is 350L/ha and desired row spacing is 45cm, the flow rate is:

0.1 x 350 x 45 = 1,575 mL/100m/outlet (or 157.5mL/10m/outlet)

Step 3

Determine your operating speed:

To determine your operating speed in the field record the time (in minutes and seconds) that it takes to travel 100 meters through soil prepared for fumigation with tynes in ground at working depth preferably with a half-full Telone Blends cylinder fitted. Table 3 will help you to establish your operating speed (in km/hour) from the time it took to travel 100 meters.
Note! Do not use tachometer or speedometer because wheel slippage makes these inaccurate for measuring true speed.

Table 8: Calculating operating speed

<table>
<thead>
<tr>
<th>Operating speed minutes/100m</th>
<th>meters/minute</th>
<th>km/hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.0</td>
<td>16.67</td>
<td>1</td>
</tr>
<tr>
<td>3.0</td>
<td>33.33</td>
<td>2</td>
</tr>
<tr>
<td>2.0</td>
<td>50.00</td>
<td>3</td>
</tr>
<tr>
<td>1.5</td>
<td>66.67</td>
<td>4</td>
</tr>
<tr>
<td>1.2</td>
<td>83.33</td>
<td>5</td>
</tr>
<tr>
<td>1.0</td>
<td>100.00</td>
<td>6</td>
</tr>
<tr>
<td>0.85</td>
<td>116.67</td>
<td>7</td>
</tr>
<tr>
<td>0.75</td>
<td>133.33</td>
<td>8</td>
</tr>
</tbody>
</table>

Record your operating speed on Table 10

Step 4

Determine flow rate per outlet per 100m bed needed at 1km/h:

Record the flow rate per outlet at 1km/h on Table 10

Step 5

Calculate flow rate at operating speed:

\[
\text{Flow rate per outlet/100m at 1 km/h (from step 4)} \div \text{Operating speed min/100m (from step 3)} = \text{Flow rate per outlet at operating speed}
\]

Record the flow rate at operating speed on Table 10

Step 6

Set an operating pressure:

This is the pressure at the orifice and should be set to suit your specific equipment. Use the lowest working pressure that still allows efficient operation of the check valves and provides appropriate flow rate.

For this exercise use an operating pressure of 200 kPa
Step 7

Select an orifice plate

Look at Table 9. Find the flow rate (Telone Blends column) that cross-references with a working pressure (kPa column) closest to your preference. Read across to the orifice plate number on the left-hand column. This will provide the appropriate application rate as long as you maintain the other variable factors at stages 2 – 6.

Table 9: Orifice plate specifications

<table>
<thead>
<tr>
<th>Plate number (from step 5)</th>
<th>Working pressure</th>
<th>Telone BLENDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>4916-</td>
<td>kPa</td>
<td>mL/Min</td>
</tr>
<tr>
<td>51</td>
<td>103.4</td>
<td>660.58</td>
</tr>
<tr>
<td></td>
<td>137.9</td>
<td>762.78</td>
</tr>
<tr>
<td></td>
<td>172.4</td>
<td>852.81</td>
</tr>
<tr>
<td></td>
<td>206.8</td>
<td>934.21</td>
</tr>
<tr>
<td></td>
<td>241.3</td>
<td>1009.06</td>
</tr>
<tr>
<td></td>
<td>275.8</td>
<td>1078.73</td>
</tr>
<tr>
<td>52</td>
<td>103.4</td>
<td>668.59</td>
</tr>
<tr>
<td></td>
<td>137.9</td>
<td>772.02</td>
</tr>
<tr>
<td></td>
<td>172.4</td>
<td>863.15</td>
</tr>
<tr>
<td></td>
<td>206.8</td>
<td>945.53</td>
</tr>
<tr>
<td></td>
<td>241.3</td>
<td>1021.29</td>
</tr>
<tr>
<td></td>
<td>275.8</td>
<td>1091.81</td>
</tr>
<tr>
<td>54</td>
<td>103.4</td>
<td>720.64</td>
</tr>
<tr>
<td></td>
<td>137.9</td>
<td>832.12</td>
</tr>
<tr>
<td></td>
<td>172.4</td>
<td>930.34</td>
</tr>
<tr>
<td></td>
<td>206.8</td>
<td>1019.14</td>
</tr>
<tr>
<td></td>
<td>241.3</td>
<td>1100.79</td>
</tr>
<tr>
<td></td>
<td>275.8</td>
<td>1176.80</td>
</tr>
</tbody>
</table>

Record the orifice plate number on Table 10

Table 10 Key:

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>L/ha</td>
<td>Litres per hectare</td>
</tr>
<tr>
<td>ml/m</td>
<td>millilitres per minute</td>
</tr>
<tr>
<td>cm</td>
<td>centimetres</td>
</tr>
<tr>
<td>km/h</td>
<td>kilometres per hour</td>
</tr>
<tr>
<td>kPa</td>
<td>kilopascals</td>
</tr>
</tbody>
</table>
Table 10: Information required for selecting an orifice for systems that use orifices and pressure to meter product

<table>
<thead>
<tr>
<th>Information required</th>
<th>Where from?</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>APPLICATION RATE</td>
<td>Product label: DIRECTIONS FOR USE</td>
<td></td>
</tr>
<tr>
<td>TYNE SPACING</td>
<td>Equipment / crop requirements</td>
<td></td>
</tr>
<tr>
<td>OPERATING SPEED</td>
<td>In-field trial + Table 3 (m/Min)</td>
<td></td>
</tr>
<tr>
<td>FLOW RATE PER OUTLET AT 1km/h</td>
<td>Table 4</td>
<td>mL/100M</td>
</tr>
<tr>
<td>FLOW RATE AT OPERATING SPEED</td>
<td>Divide the answers from:</td>
<td>Step 3 ÷ Step 4</td>
</tr>
<tr>
<td>WORKING PRESSURE</td>
<td>Equipment specifications</td>
<td></td>
</tr>
<tr>
<td>ORIFICE PLATE NUMBER</td>
<td>Table 5</td>
<td></td>
</tr>
</tbody>
</table>

Testing your calibration

The success of a calibration exercise depends on the accuracy of your calculations and your ability to maintain operating speed and pressure while fumigating.

The most reliable method of testing your calibration is by weighing the cylinder:

a) Mark out 100 meters in a strip of land to be fumigated;
b) Record the weight of the cylinder prior to starting the test run;
c) Fumigate the 100 meter strip while maintaining operating speed and pressure according to the calibration calculations (steps 3 and 6);
d) Stop at the end of the 100 meter strip; weigh the cylinder again;
e) Calculate the difference between the starting weight and the end weight in kilograms;
f) Calculate the area of the test strip (in hectares);
g) Establish an output rate for the test strip are in kg/ha; and
h) Compare this with the application rate in the calibration process used. They should be similar.

Remember!

It is critical that any method of testing calibration does not release Telone Blends above soil level.
Applying Telone Blends

Application is the most hazardous stage of the process; effective pre-fumigation planning will ensure you are prepared for any incidents that may occur.

Maintaining the conditions used for calibration

As part of your responsibility to meet the label requirements for Telone Blends you need to be sure that the rate is equivalent to those provided on the product label (see Telone Blends product label section: DIRECTIONS FOR USE). While calibration of your equipment is the first step of this process, maintaining the calibration while fumigating is essential.

During application you will need to maintain a constant:

- Operating speed; and
- Operating pressure.

Remember!

Altering any of the parameters set during calibration will alter the rate at which you are applying Telone Blends. Be sure it does not exceed the label rates provided in the Directions for Use.

Minimising end-of-row spillage

There is a considerable risk of exposure when completing a run across a block (whether performing broad acre or strip fumigation) from spillage of product at the end of a row. Methods should be introduced to minimise this spillage.

What does the label say?

Product spillage at the end of rows should be minimised. An effective flow shut-off device must be used to prevent discharge of fluid at the end of rows.

After shutting off flow, run tynes underground for 30cms to limit spillage that may occur when the tyne is raised from the ground.

See Telone Blends label section: Application Methods and Equipment

Methods that reduce the possibility of end-of-row spillage include:

- Shut off product flow 30cm before the end of the row and flush the lines with nitrogen;
- Avoid entering areas where product has dribbled from the tynes;
- Minimise the volume of injection lines below the shut-off valve (Note! the line volume must be able to supply adequate flow rates);
- Ensure all valves are maintained to the manufacturer’s specifications.
Other hints when applying Telone Blends

- Where possible work into the wind;
- Ensure that the tynes of the application equipment are buried before you pressurise the lines;
- If you are using plastic to seal your soil, be sure that the end of the sheet is sealed before commencing a row;
- Check your operating speed and pressure regularly to ensure you are maintaining the conditions of calibration;
- Ensure you maintain an even flow of Telone Blends through all the application lines during fumigation (ideally use flow meters);
- Always use appropriate PPE during application of Telone Blends (see Chapter 7); and
- Always purge the injection lines with nitrogen just prior to the end of each row or when a plastic roll ends.

When you complete a fumigation task:

- Flush any fumigant remaining in the equipment into the ground with nitrogen during the last run for the day; ensure the tynes are in the ground during this process;
- Disconnect the cylinders, ensure all the valves are shut and re-cap the cylinder.

Your Task

Inspect the examples of application equipment on display. Trace the flow of fumigant through the rig. Include the main features of the system (for example, valves, flow meters, etc.)
Cleaning and maintenance of equipment after fumigation

The ‘closed system’ you use to distribute Telone Blends must be flushed at the completion of a fumigation task. Fumigant trapped in the system can pose a health hazard during maintenance and reduce the lifespan of the system components.

It is important that all of the lines on fumigation equipment are flushed with nitrogen at the conclusion of the fumigant task. When flushing the equipment make sure that the tykes are in the ground and the soil is sealed afterwards.

The exterior of the rig also requires cleaning to remove soil (which can transfer soil-borne pests) and any fumigant residues (which pose a health risk to anyone near the rig).

What does the label say?

- Clean equipment of all soil or plant debris before using but DO NOT allow water to enter fumigant lines or containers

- Since the product is corrosive under certain conditions, flush all application equipment with diesel oil or kerosene immediately after use. Dispose of all flushing solution by incorporation into the treated field or by other means in accordance with appropriate State legislation.

- Fill pumps and meters with new motor oil or a 50% motor oil/diesel oil mixture before storing.

See Telone Blends label section: Cleaning Equipment

Partially used cylinders

After completing fumigation empty cylinders of Telone BLENDS must be handled appropriately. Even if a Telone Blends cylinder is empty you must handle and store it in the same way as full cylinders. The vapours remaining in the cylinder are toxic and present a risk if they are allowed to escape into the atmosphere.

Group task

In conjunction with the (M)SDS read Appendix 4: First Aid for Telone Blends and discuss the appropriate response to accidents with Telone Blends.

Notes:
Chapter 5: Applying Rural InLine

Effective placement of Rural InLine in the soil is critical to the success of the fumigation task.

Before applying Rural InLine consider the following issues:

- You must set up the equipment to meet the label and safety requirements;
- The application rate must be calculated;
- Rural InLine must be applied safely and effectively;
- Cleaning and maintaining of application equipment; and
- Hazards associated with applying Rural InLine must be addressed.

Setting up fumigation equipment

Equipment used for Rural InLine fumigation needs to be suitable for the application method and calibrated to ensure you are applying the product within recommended rates.

Setting up the equipment requires:

- Maintaining a ‘closed system’ for application;
- Ensuring equipment and delivery lines are constructed of compatible materials;
- Ensuring drip tape leaks and blockages have been repaired;
- Ensuring correct placement of drip tape.

When applying Rural InLine the system is pressurised by water.

Equipment design: providing a ‘closed system’

Rural InLine is a hazardous product and could cause serious injury or illness if handled incorrectly. The primary aim when handling Rural InLine is to eliminate the possibility of accidental escape of the fumigant from the drum, application equipment or the treated soil: this can be done by handling the product through a closed system.

The closed system provides an application environment where Rural InLine is safely contained by the application system at each stage of the application process. This is achieved by using:

- Leak-proof containers/drums which contain the product during storage and transport
- Leak-proof application equipment which pressurises, transfers and meters the flow of the product; and
- Drip line injection which delivers to sealed and correct row positioning.
Materials compatible with Rural InLine

You must ensure the application equipment is constructed of material suitable for use with Rural InLine. Some materials react with this product and under some conditions can produce hazardous decomposition products. Appropriate materials for use with Rural InLine are shown below.

Materials compatible with Rural InLine:

Hoses, pipes and transfer lines:
- Nylon; cross-linked polyethylene; High-density-polyethylene; Polypropylene; Steel; Copper; Low-density-polyethylene; Teflon; Brass

Seals, gaskets and packing:
- Teflon; Nylon; Polypropylene; Viton

Valves and fittings:
- Stainless steel; Brass; Copper; Polypropylene; Nylon; Cross-linked high-density polyethylene

What does the label say?

DO NOT use containers, pumps or other transfer equipment made of aluminium, magnesium or their alloys as under certain conditions this product may be severely corrosive to such metals. Australian Standards approved Teflon-braided hoses are preferred as transfer lines for Rural InLine.

Application

Equipment
Both sides of the drip fumigation equation (the chemical side and the water side) require certain essential pieces of equipment.
Chemical Side Equipment

- Rural InLine is delivered in 150kg drums
- Automatic, quick closing check valve to prevent the flow of fluid back toward the chemical supply or injection pump
- Automatic valve located on the intake side of the injection pump and connected to the system interlock to prevent fluid from being drawn from the supply tank when the irrigation system is shut down
- Injection system metering pump such as a positive displacement injection or diaphragm pump, or a venturi system
- Filter

Water Side Equipment

- A water flow meter is required to monitor the amount of water going to the treatment zone. This information is needed to calculate the ppm
- A water filter ensures a clean water supply
- A backflow prevention device to prevent contamination of the water supply
- A pressure regulator to prevent irrigation system damage due to excessive pressure

Drip Tape Placement

Either buried drip tape or surface drip tape may be used with Rural InLine. It is recommended that emitters be spaced 20 to 30cm apart. For fields with significant slope, pressure compensated drip tape is recommended.

Leak Management

Applicators are required to make sure there are no leaks in the irrigation system and to verify uniformity of irrigation. It may be necessary to pre-irrigate the bed to 50% saturation. Do not completely saturate the bed. If the bed is too wet or too dry, the fumigant will not distribute adequately throughout the bed.

Set up requirements for drip tape fumigation:

- The soil must be adequately sealed prior to, during, and after placement of the fumigant
- Irrigation system and Drip tape must be checked for leaks and all leaks repaired
- Drip tape must be correctly positioned to treat plant root zones
Calculating the application and flow rates for drip irrigation application

Applying fumigant through drip irrigation systems requires the correct blending of water and fumigant. To ensure the product is applied correctly you need to calculate the amount of Rural InLine needed for the area to be treated, the chemical injection rate and how long to run the application.

Before commencing you need to know:

- The size of the area to be treated
- The flow rate of the water going to the treatment zone
- The pump capacity of the irrigation system

Calculating the dosage of Rural InLine

Size of area to be treated

To calculate the application rate for Rural InLine the first step is to establish a rate suited to your situation. To do this you will need to consult the table in the DIRECTIONS FOR USE section of the Rural InLine product label.

The rate of application you choose for Rural InLine will depend on:

- The crop proposed for the site
- Degree of pest incidence
- Environmental conditions at the time of application

**Remember!**

*Always check the label to ensure you are using Rural InLine within the range of rates for that situation.*

- Using lower rates than the minimum stated may reduce the effectiveness of the treatment
- Use of higher rates than those stated is illegal
Rural InLine Calculation Exercise

Step 1
Establish the dilution rate

Read the DIRECTIONS FOR USE table on the Rural InLine product label.

Step 2
Determine the size of the area
To calculate the size of the area to be treated the following formulas are used.

- **Broadacre:** Length of area to be fumigated \( \times \) Width of area to be fumigated = Total M\(^2\)
  
<table>
<thead>
<tr>
<th>Length of Area to be Fumigated</th>
<th>( \times )</th>
<th>Width of Area to be Fumigated</th>
<th>=</th>
<th>Total M(^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>M(^2)</td>
</tr>
</tbody>
</table>

Record your answer on table 11

- **Strip Fumigation:** Length of Bed \( \times \) Width of Bed \( \times \) Number of Beds = Total M\(^2\)
  
<table>
<thead>
<tr>
<th>Length of Bed</th>
<th>( \times )</th>
<th>Width of Bed</th>
<th>=</th>
<th>Total M(^2)/Bed</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>M(^2)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total M(^2)/Bed</th>
<th>( \times )</th>
<th>Number of Beds</th>
<th>=</th>
<th>Total M(^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>M(^2)</td>
</tr>
</tbody>
</table>

Record your answer on table 11

Step 3
Determine the amount of Rural InLine required
To calculate the amount of Rural InLine required the following formulas are used.

- **For Very Bad Disease, Nematodes and Weeds in Clay Loam Soil for Strawberries**
  Total M\(^2\) \( \times \) 70gm/m\(^2\) = Total Kg of Rural InLine Needed

<table>
<thead>
<tr>
<th>Total M(^2)</th>
<th>( \times )</th>
<th>Rate/m(^2)</th>
<th>=</th>
<th>Total Rural InLine Needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>Kg</td>
</tr>
</tbody>
</table>

- **For Moderate Disease and Nematodes in Sandy Soil for Capsicums**
  Total M\(^2\) \( \times \) 50gm/m\(^2\) = Total Kg of Rural InLine Needed

<table>
<thead>
<tr>
<th>Total M(^2)</th>
<th>( \times )</th>
<th>Rate/m(^2)</th>
<th>=</th>
<th>Total Rural InLine Needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>Kg</td>
</tr>
</tbody>
</table>

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Chapter 5  
55  
Telone Blends and Rural Inline  
Guide to Application

➢ For Light Disease and Nematodes in Heavy Loam Soil for Strawberries  
Total $M^2 \times 35\text{gm/m}^2 = \text{Total Kg of Rural InLine Needed}$

<table>
<thead>
<tr>
<th>Total $M^2$</th>
<th>$\times$</th>
<th>Rate/m$^2$</th>
<th>$=$</th>
<th>Total Rural InLine Needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>$X$</td>
<td></td>
<td>$=$</td>
<td></td>
<td>$Kg$</td>
</tr>
</tbody>
</table>

Record your answer on table 11

Step 4  
Determining Pump Flow Rate

<table>
<thead>
<tr>
<th>Length of Rows $M$</th>
<th>$\times$</th>
<th>Number of Drippers</th>
<th>$\times$</th>
<th>Size of Drippers (e.g. 5L/Hr/M)</th>
<th>$=$</th>
<th>Total Litres/Hr</th>
</tr>
</thead>
<tbody>
<tr>
<td>$X$</td>
<td></td>
<td>$X$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Step 5  
Determining the Amount of Water Needed

<table>
<thead>
<tr>
<th>Total Rural Inline Needed Kg</th>
<th>Divide</th>
<th>Maximum Concentration/1000L</th>
<th>$\times$</th>
<th>Water 1000 L</th>
<th>$=$</th>
<th>Total Litres of Water Needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\div$</td>
<td>Kg</td>
<td></td>
<td>$X$</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

or

<table>
<thead>
<tr>
<th>Total Rural Inline Needed Kg</th>
<th>Divide</th>
<th>Minimum Concentration/1000L</th>
<th>$\times$</th>
<th>Water 1000 L</th>
<th>$=$</th>
<th>Total Litres of Water Needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\div$</td>
<td>Kg</td>
<td></td>
<td>$X$</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Record your answer on table 11

Step 6  
Determining length of application time

<table>
<thead>
<tr>
<th>Total Litres of Water Needed</th>
<th>Divide</th>
<th>Pump Flow Rate L/Hr</th>
<th>$=$</th>
<th>Number of Hours to Apply Fumigant</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\div$</td>
<td>L/Hr</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Number of Hours to Apply Fumigant Hrs</th>
<th>$\times$</th>
<th>60 Minutes</th>
<th>$=$</th>
<th>Total Number of Minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$X$</td>
<td>60</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Record your answer on table 11
Chapter 5

Telone Blends and Rural Inline
Guide to Application

Step 7
Determining the Application Rate

<table>
<thead>
<tr>
<th>Total Kg Fumigant</th>
<th>Divide</th>
<th>Total Minutes</th>
<th>=</th>
<th>Total Kg/Minute</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kg</td>
<td></td>
<td></td>
<td>=</td>
<td></td>
</tr>
</tbody>
</table>

Record your answer on table 11

Table 11: Information required for applying Rural InLine via drip irrigation.

<table>
<thead>
<tr>
<th>Information required</th>
<th>Where from?</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1 RATE / M²</td>
<td>Product label: DIRECTIONS FOR USE</td>
<td></td>
</tr>
<tr>
<td>Step 2 AREA SIZE</td>
<td>M² to be fumigated</td>
<td></td>
</tr>
<tr>
<td>Step 3 INLINE REQUIRED</td>
<td>Step 1 multiplied by Step 2</td>
<td></td>
</tr>
<tr>
<td>Step 4 PUMP FLOW RATE</td>
<td>Litres of water per minute put out by pump</td>
<td></td>
</tr>
<tr>
<td>Step 5 LITRES OF WATER NEEDED</td>
<td>Step 3 divide by Step 1</td>
<td></td>
</tr>
<tr>
<td>Step 6 APPLICATION TIME</td>
<td>Step 4 divide by Step 6</td>
<td></td>
</tr>
<tr>
<td>Step 7 APPLICATION RATE</td>
<td>Step 3 divide by Step 6</td>
<td></td>
</tr>
</tbody>
</table>

Applying Rural InLine:
Application is the most hazardous stage of the process; effective pre-fumigation planning will ensure you are prepared for any incidents that may occur.

When applying Rural InLine, inject it at the Glasshouse, not at the pump as the Rural InLine may damage the water pipe.
Maintaining conditions of calculation:
As part of your responsibility to meet the label requirements for Rural InLine you need to be sure that the rate is equivalent to those provided on the product label (Rural InLine product label section: DIRECTIONS FOR USE). Maintaining the correct application rate while fumigating is essential.

During application you will need to maintain a constant:

- Injection rate
- Water flow rate

Remember!
An Altering any of the parameters set during application calculations will alter the rate at which you are applying Rural InLine. Be sure it does not exceed the label rates provided in the Directions for Use.

Avoid Ponding, Puddling or Run Off
Ponding, Puddling and Run Off should be prevented as a high moisture content in some areas may inhibit the movement of the fumigant into that area, or alternatively it may severely increase the time of aeration.

What does the label say?
Do not allow treatment solution to accumulate on the soil surface. If ponding, puddling or run-off occurs, then 1) discontinue application immediately, and 2) cover with soil to absorb.

See Rural InLine label section: Application Methods and Equipment.

Other hints when applying Rural InLine

- Where possible stand on the upside of the wind when monitoring application
- Check your water pressure and application rate regularly to ensure you are maintaining required conditions
- Always use appropriate PPE during application of Rural InLine (see Chapter 7)

When you complete a fumigation task:

- Continue to irrigate the area with sufficient untreated water to flush the mixture from the irrigation system completely
- Make sure any rigid PVC dead end or low spots are drained or flushed completely
- DO NOT allow any InLine to remain in the irrigation system.
- Disconnect the InLine drum and pump and ensure all valves are shut.
Your Task

Inspect the examples of application equipment on display. Trace the flow of fumigant through the system. Include the main features (for example: valves, pressure gauges, etc.).
Cleaning and maintenance of equipment after fumigation

The ‘closed system’ you use to distribute Rural InLine must be flushed at the completion of the fumigation task. Fumigant trapped in the system can pose a health hazard during maintenance and reduce the lifespan of system components.

What does the label say?

- Clean equipment of all soil or plant debris before using but **DO NOT** allow water to enter fumigant lines or containers
- Since the product is corrosive under certain conditions, flush all application equipment with diesel oil or kerosene immediately after use. Dispose of all flushing solution by incorporation into the treated field or by other means in accordance with appropriate State legislation.
- Fill pumps and meters with new motor oil or a 50% motor oil/diesel oil mixture before storing.

*See Rural InLine label section: Cleaning Equipment*

Hazards associated with Telone Blends and Rural InLine application

Care and consideration of the potential risks is essential whenever you deal with Telone Blends or Rural InLine. Possibly the most critical stage is during the application of the products.

Consideration must be given to:

- Any step during this process where you, or others, could be exposed to hazardous levels of the product;
- Developing methods used to assess the potential exposure to Telone Blends or Rural InLine;
- The flammable nature of Telone Blends and Rural InLine;
- Developing a spill / evacuation plan if there is an accident; and
- Understanding the first aid requirements in the event someone does suffer exposure to these products (see *Appendix 4: First aid for Telone Blends and Rural InLine*).

Exposure risks

Consider any possible route in which Telone Blends or Rural InLine can escape from the sealed application system or from the freshly fumigated soil. You will need to assess the likelihood of each event happening (under normal circumstances) and the potential risk it poses to people and the environment.

A critical aspect of assessing risk of accidental exposure to Telone Blends or Rural InLine during a particular task is predicting how serious that exposure will be. The (M)SDS provides exposure standards in the **PRECAUTIONS FOR USE** section.
As a general rule:

- The fumes first cause smarting, then watering of the eyes (this should be taken as a warning sign); and
- If you can smell Telone Blends or Rural InLine dangerous levels could be present.

Fire / explosion hazards

Precautions:

- Put out all pilot lights and glowing heating units.
- May form explosive mixtures with air when confined.
- Highly toxic and irritating fumes are released in a fire situation.
- Keep product vapours away from possible ignition sources.
- Vapours can form flammable mixtures at ordinary temperatures.
- Vapours are heavier than air and may travel a considerable distance where they may linger and/or find an ignition source and flash back.

Extinguishing media:

- Water fog or fine spray. Carbon dioxide. Dry chemical. Foam.
- Vapours are heavier than air and may travel a considerable distance where they may linger and/or find an ignition source and flash back.

See Telone Blends (M)SDS section: SAFE HANDLING INFORMATION, for more information on fire fighting.

If Telone Blends is involved in a fire, evacuate the area and seek expert advice immediately!

Contact Emergency Services on 000 immediately and notify Dow AgroSciences Australia Limited on 1800 033 882 (24 hours) or 1800 700 096 (Mon – Fri, 8am to 5pm EST).

Spills / accidental release procedures

The application of Telone Blends through a closed system (see Chapter 4: Equipment design: providing a ‘closed system’) aims to reduce the potential for the accidental release of this product into the atmosphere. Despite this, it is essential that you have a spill procedure in place should an accident occur.
Wear protective equipment (see PERSONAL PROTECTION). Clear area of all unprotected personnel. Prevent entry of chemical or used/damaged containers into drains, streams and waterways.

Small Spill:
- Extinguish all sources of ignition.
- Apply absorbent material such as earth, sand or clay granules or cat litter to the spill.
- Sweep up material for disposal when absorption is complete and contain in a refuse vessel for disposal (See DISPOSAL). If necessary, wash the spill area with an alkali detergent and water and absorb as above the wash liquid for disposal.

Large Spill:
- Contact Emergency Services on 000 immediately and notify Dow AgroSciences Australia Limited on 1800 033 882 (24 hours) or 1800 700 096 (Mon – Fri, 8am to 5pm EST).

Disposal:
- Contaminated material – Must be disposed of in accordance with all State and /or Local regulations.
- Large quantities – Contact Dow AgroSciences and seek advice.

See Telone Blends or Rural InLine (M)SDS section: SAFE HANDLING INFORMATION

Chapter 6. Monitor and ventilate the site of fumigation

The fumigation interval
After placement of Telone Blends or Rural InLine sufficient time must be allowed for the fumigant to diffuse through the soil and kill the target pests. This ‘treatment’ period must be followed by a period of ‘ventilation’ to allow harmful fumigant residues to exit the soil.

The periods of treatment and ventilation are collectively known as the fumigation interval (see Figure 8 & 9).

The fumigation interval tells us:
- how long to leave the soil undisturbed to allow the fumigant to treat the soil; and
- how long the ground should be left from the date of fumigation before planting can occur.
Factors that affect fumigant movement after placement

After the initial placement of Telone Blends or Rural InLine the volatile liquid will form a gas and diffuse through the soil profile, moving from points of high concentration (the site of placement) to areas of low concentration (the surrounding soil). A number of factors can impact on the movement of Telone Blends and Rural InLine during the fumigation interval.

We have discussed the importance of soil and environmental conditions during placement of Telone Blends and Rural InLine. However these same conditions can impact on the effectiveness of the treatment after placement.

The active ingredient in Telone Blends and Rural InLine (1,3-Dichloropropene) moves slowly through the soil. The rate of diffusion of Telone Blends and Rural InLine can be further reduced by wet, cold soil conditions. If the treated soil is exposed to these conditions during the fumigation interval it can reduce the effectiveness and/or speed of the treatment.

Some examples of the impact of environmental conditions during the fumigation interval:

- **Cool conditions** may slow the movement of Telone Blends and Rural InLine requiring a longer period of treatment before ventilation occurs (e.g. maintain the soil seal for a longer period).
- **Heavy rain** can block the passage of Telone Blends and Rural InLine through the soil profile (through waterlogging) and result in the fumigant being degraded or leached through the profile (assuming soil is not covered by a plastic tarp).

What is the fumigation interval for Telone Blends?

- leave the soil undisturbed for at least 7 days after application; and
- Unplanted for at least 14 days after application of the fumigant.

Note!

Don’t just assume that the soil is ready for planting 14 days after fumigation. It always pays to test the soil for fumigant residues that may impact on plant health. A method for lettuce germination test (to help determine plant back times) can be found in Appendix 5 of this manual.

What is the fumigation interval for Rural InLine?

- leave the soil undisturbed for at least 5 days after application; and
- Unplanted for at least 21 days after application of the fumigant.

Note!

Don’t just assume that the soil is ready for planting 21 days after fumigation. It always pays to test the soil for fumigant residues that may impact on plant health. A method for lettuce germination test (to help determine plant back times) can be found in Appendix 5 of this manual.
- High soil temperature (e.g. > 27°C) can result in a rapid increase in the movement of the fumigant through, and out of the soil reducing the treatment time (therefore reducing efficacy).

**Remember!**

*The actual impact of environmental conditions will depend on many factors specific to your site. Keep in mind that cool and wet conditions slow the passage of fumigant and hot, dry conditions speed it up.*

**Security during the fumigation interval**

During the fumigation interval access to the site must be restricted, as hazardous levels of Telone Blends or Rural InLine may still be present. Fumigant gas can begin exiting the soil within hours of placement, posing a risk of exposure to anyone who enters the area. Re-entry to the site during this period must be strictly controlled. Where possible the site should not be entered by anyone during this period.

Site security measures during the fumigation interval:

- Where possible, avoid entry into the treated area for 5 days;*
- Anyone entering or working in the vicinity of the fumigation area within the first 5 days* after application must wear appropriate PPE (see Chapter 7: Use and maintenance of PPE);
- Maintain warning signs at all approaches to the site of fumigation until ventilation is completed (NB: If the site of fumigation has staff / visitors who use English as a second language consider the need for multi-lingual warnings);
- All people on the property should be warned of the hazards of entry to the fumigation area.

*Note: If odour persists after 5 days use the appropriate PPE when entering the site.

![The fumigation interval time-line for Telone Blends](image)
Soil ventilation after fumigation with Telone Blends

After the initial treatment period of 7 days soil must be ventilated for a further 7 days prior to planting. This allows any remaining fumigant residues to exit the soil to planting. Fumigant residues can significantly impact on plant health.

The techniques of ventilation you employ will depend on the crop conditions. Ventilation methods include:

- Cutting planting holes in plastic tarp;
- Removal of plastic tarps; and / or
- Cultivation (be sure the equipment is clean and cultivation does not bring up untreated soil).

![Diagram: The fumigation interval time-line for Rural InLine]

Soil ventilation after fumigation with Rural InLine

After the initial treatment period of 5 days soil must be ventilated for a further 16 days prior to planting. This allows any remaining fumigant residues to exit the soil to planting. Fumigant residues can significantly impact on plant health.

The techniques of ventilation you employ will depend on the crop conditions. Ventilation methods include:

- After 5 days, holes can be punched into the plastic to allow quicker aeration
- Glasshouses – can remove temporary plastic covering

Checking for fumigant residues in soils

After the recommended period of ventilation you can conduct tests to assess if harmful levels of fumigant residue remain in the soil. The most reliable method for testing your soil for fumigant residues is to send a soil sample to a diagnostic laboratory. However this can be expensive and may not provide timely results.
A less precise but useful tool you can use yourself is to conduct germination tests with the soil from your plots. If sufficient levels of fumigant residues exist in the soil it will affect or inhibit the germination of seed from some ‘indicator’ plants (see Appendix 5: Lettuce test for fumigant residues).

Cleaning up after fumigation

Re-contamination of fumigated soils
Successful fumigation must be followed by good hygiene practices to ensure the benefits are passed on to the crop you intend to plant. If you re-contaminate the soil you have fumigated with non-fumigated soils or diseased planting material the benefit is not only lost, but things may get a lot worse.

Fumigation creates a biological vacuum in the soil. In healthy soils there is a balance between beneficial and harmful organisms. In soils where this balance has been upset harmful organisms can multiply to levels that affect plant growth. When you fumigate to control a disease problem you wipe out the beneficial organisms that are trying to compete with the harmful ones.

The soil after fumigation provides an environment in which plants can grow without competition for a time while the soil organisms slowly re-colonise the treated area. If you introduce disease back into this soil it can rapidly multiply, as the beneficial organisms are not there in sufficient numbers to create a balance. This could result in a larger pest problem than you started with.

Remember!

- Telone Blends and Rural InLine will control pests that are present in the soil treatment zone at the time of fumigation;
- However, they will not control pests that are introduced into soil after fumigation.

After fumigation, it is essential to maintain a high level of hygiene in the treated areas:

- DO NOT use irrigation water, transplants, seed, footwear, hand tools or equipment that could carry soil borne pests from infested land;
- Avoid contamination from moving infested soil onto treated beds through cultivation or movement of soil from below the treated zone; and
- Clean equipment carefully before entering treated fields.
Removal of warning notices
At the completion of the fumigation task (when ventilation is completed) the warning signs may be removed from the site. Remember to store the signs in a safe place to ensure they are ready for use when you next fumigate.

It is important that you review the information on the warning sign prior to the next fumigation task to ensure the information is correct.

Things to check:

- Are the fumigation details up-to-date?
- Is the number for the Poisons Information Centre correct – for example, has it changed?
- Is the information on the sign clear and easy to read?

Hazards during the fumigation interval
The major risk during the fumigation interval is exposure to escaping fumigant residues. When conducting your risk assessment for the fumigation task (see Risk Management Procedures, Chapter 1) you will need to consider the potential for exposure to fumigant gas during the fumigation interval.

Fumigant escape from treated soils
Reasons for fumigant escape during the fumigation interval include:

- Poor sealing techniques – Plastic tarp is not sufficiently dug into the soil, compacted surface cracks due to loss of moisture, inappropriate soil preparation; Greenhouse not sealed properly;

- A loss of seal due to mechanical damage – Take care to avoid any damage to the seal caused by machinery entering fumigated ground (e.g. tearing of the tarp or disturbing the compaction layer);

- Gradual dissipation of the fumigant from the soil – The normal movement of fumigant residues out of the soil;

- Cool, wet conditions or heavier soils – These conditions can slow the movement of Telone Blends and Rural InLine. Where possible extend the period of ventilation and be aware of the potential for increased residue levels (PPE may be required during ventilation).

The best protection during the treatment period (first 5-7 days) is to stay away from the treatment area. If you, or others, need to enter the treated site or adjacent areas, be sure that everyone else is warned of the risks and the appropriate PPE is used.

Remember!
There are specific guidelines for re-entry into the treatment area after fumigation (see Telone Blends and Rural InLine label sections: Precautions – Re-entry Period).
Your task

Read the Telone Blends or Rural InLine label section Soil Fumigation Interval and Re-entry Period and note the main points below.

Soil Fumigation Interval

Re-Entry Period

Chapter 7: Fumigation records

Keeping good records of your soil disinestation practices is an important management tool for farmers and fumigation contractors. Your records will help you to build up a profile of the effectiveness of your fumigation practices over a number of years.

Good reasons to keep good soil fumigation records:

- **Meeting your legal responsibilities** – Many states have minimum record keeping requirements for fumigators;

- **Getting the BIG picture** – Records help you to observe any trends over the years and learn from past successes / mistakes;

- **As protection** – Good records of your activities can help you if there are issues arising from fumigation in the future (e.g. legal issues relating to crop damage, employee claims).
Mandatory requirements

Both state and federal legislation regulate fumigation. Federal legislation will, in general, provide the framework from which states build their specific legislation. As fumigators you will need to be aware of the specific requirements in your state. A part of your responsibilities may include some mandatory record keeping.

Records may need to be kept for a number of reasons including:

- **Hazardous substances legislation** – records related to risk assessment procedures etc.
- **Work Health and Safety** – PPE and training records.
- **Plant and equipment legislation** – records of plant safety assessment.

An example of record keeping

Telone Blends and Rural InLine are classified as a Dangerous Poisons (S7). Records should be in a form easily retrieved and which others can understand.

Records include:

- Name and address of chemical supplier;
- Name and quantity of chemical product;
- Batch number, and where applicable expiry date of the chemical product;
- Withholding period;
- Address or location of treated area;
- Name of pest or disease to be controlled or eradicated;
- Weather conditions at time of application including temperature, wind direction, and speed and any changes during application;
- Date and time of application;
- Calibration details;
- Rate and method of application;
- Name and address of person applying the chemical, or if applicable the person supervising the application of the chemical;
- Employee training and health;
- Chemical stock control;
- Equipment maintenance;
- Testing, use and maintenance of personal protective equipment.
Record Keeping

It is good practice to keep complete records on fumigation even if state laws do not require you to. The ACUP (Victoria’s Agricultural Users Permit) system record keeping requirements are a good example of what to keep.

Additional records include:

- **Who was involved** – Staff involved, training supplied;
- **Soil sample results** – Pest identified, what levels are present?
- **Post fumigation sampling results** – Pests remaining after fumigation, fumigant residue test results;
- **Crop details** – Variety, seedling / seed source, planting date (conditions of planting);
- **Fertiliser record** – Soil test results, fertiliser applied;
- **Personal protective equipment (PPE) records** – Keep a record of who has been issued PPE and when it is used.
- **Training records** – Which members of the fumigation team have attended relevant training, what was the course? When was it held? Keep copies of certificates / licences.

**Remember!**

*Your records are only as good as the effort you put into them. Keeping them well organised will make it easier to keep them up to date and retrieve information at a later date.*

Chapter 8: Use and maintenance of personal protective equipment

It is a condition of use for Telone Blends that you use the appropriate personal protective equipment (PPE) during fumigation. This section will look at using and caring for your PPE.

What is the function of PPE?

**Respiratory protection**

What does the label say?

The matching sections on the (material) safety data sheet are:

**Acute:**

Inhaled: Very toxic by inhalation. The LC50 for a similar product was 477 mg/m³. A single brief (minutes) inhalation exposure to easily attainable concentrations may cause severe irritation and injury to upper respiratory tract and lungs. Excessive exposure may cause carboxyhemoglobinemia, thereby impairing the blood’s ability to transport oxygen. The chloropicrin in Telone Blends has also caused weak irregular heart action and muscle damage upon severe exposure.
PPE items that provide respiratory protection are:

- A full face-piece respirator and organic vapour gas cartridge; or
- Approved positive-pressure self-contained breathing apparatus.*

*Only required where concentrations of Telone Blends or Rural InLine are very high or there is a risk of a low oxygen environment.

The primary role of the full face-piece respirator is to filter dangerous vapour from the air you are breathing. The filter cartridge fitted to the respirator must be a type approved for Telone Blends and Rural InLine. A secondary role of the full-face respirator is that it covers the eyes protecting them from splash and aerosols (fine airborne droplets).

WHY IS SO MUCH PPE REQUIRED FOR TELONE BLENDS AND RURAL INLINE?

Telone, Telone Blends and Rural InLine have been registered with the National Registration Authority (APVMA) who have assessed the product for Health and Safety requirements and applied the PPE standards. All fumigants must be treated with extreme caution, particularly in preventing respiratory exposure.

When choosing respirator cartridges inform the supplier that you want:

- An organic vapour gas cartridge;
- For use with 1,3-Dichloropropene and Chloropicrin;*

*The active ingredients in Telone Blends and Rural InLine.

Note! Further information about the choice and use of respirators can be found in AS/NZS ‘Selection, use and maintenance of respiratory protective devices’. These are available from SAI Global Australia Phone: 131 242 (within Australia)

Positive-pressure self-contained breathing apparatus provides a clean air supply from an air tank attached. This mask uses a positive pressure flow, not the on-demand flow that underwater gear uses. This means that air is always being pushed into the mask as the user breathes, keeping the pressure.
inside the mask slightly higher than the outside air pressure. This ensures that any gaps in the mask won’t allow toxic gasses inside.

**Eye / face protection**

<table>
<thead>
<tr>
<th>The label says:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>The corresponding section in the (M)SDS is:</strong></td>
</tr>
<tr>
<td><strong>Eye</strong> – May cause severe eye irritation with corneal injury which may result in permanent impairment of vision, even blindness. The fumes first cause smarting, then watering of the eyes. This should be taken as a warning sign.</td>
</tr>
<tr>
<td>See Telone Blends and Rural InLine (M)SDS: HEALTH HAZARD DATA</td>
</tr>
</tbody>
</table>

The PPE item that provides eye / face protection is:

- A full face-piece respirator

The full face-piece respirator provides protection against splash and aerosols to the user through the lens that covers the eyes and upper face. A full face-piece respirator combines the protection of goggles and a respirator in one item of PPE.

It is essential to ensure the lens in the respirator is kept clean and is not cracked or chipped.

**Hand / skin protection**

<table>
<thead>
<tr>
<th>The label says:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>The corresponding section in the (M)SDS is:</strong></td>
</tr>
<tr>
<td><strong>Skin</strong> – A single prolonged exposure may result in the material being absorbed in harmful amounts. The LD&lt;sub&gt;50&lt;/sub&gt; (rabbit) for skin absorption is &lt;500 mg/kg. Short single exposure may cause severe skin irritation, even a burn. Has caused skin sensitisation when tested in guinea pigs.</td>
</tr>
<tr>
<td>See Telone Blends and Rural InLine (M)SDS: HEALTH HAZARD DATA</td>
</tr>
</tbody>
</table>

PPE items that provide hand / skin protection are:

- Cotton overalls buttoned to the neck and wrist for Telone Blends and chemical resistant overalls zipped to the neck and wrist and ankle cuffs over the top of gloves and boots;
- Washable hat;
- Chemical resistant apron;
- Elbow length neoprene gloves; and
- Chemical resistant footwear (not leather).

The cotton overalls provide basic protection from splash or aerosols for your body. They must be able to be buttoned up to the neck and each wrist. Ideally choose overalls with press-studs so they may be quickly removed if they become contaminated.
The chemical resistant overalls will provide protection from liquid spills. The wrist and ankle cuffs must be worn outside of gloves and boots to prevent spills from being able to enter and fill the gloves and boots.

A washable hat is required to protect your head. Ideally it should fit over your respirator so it can be removed easily if it becomes contaminated.

The chemical resistant apron provides an extra layer of protection over your overalls. Before purchasing the apron check with the supplier that it is resistant to Telone Products.

Neoprene elbow-length gloves provide protection to your hand and lower arms.

Only use chemical resistant footwear suited for use with Telone Products. Do not use leather boots as they can absorb the fumigant, resulting in prolonged skin contact with Telone Products.

Selecting and using your PPE

Your PPE must meet four basic conditions:

- it must be of a type suited for use with Telone Blends and Rural InLine;
- it must be in good working order;
- fit the user well;
- it must be of the type required for the fumigation task you are involved in.

The best way to ensure you get the correct PPE for the job is to ask the supplier to recommend products that suit the label requirements. Be sure to inform your PPE supplier of the exact fumigant product you are using.

The choice of PPE depends on the task to be performed. The label and (M)SDS set out the specific PPE required for activities during fumigation. The following list details specific fumigation activities and the PPE required for all staff involved. If at any other time you feel there is a risk of exposure to Telone Products, choose the PPE for the relevant situation from the list below.

Application of the product:

- Cotton or chemical resistant overalls and a washable hat;
- Chemical resistant apron;
- Elbow length neoprene gloves;
- Chemical resistant footwear (not leather); and
- Full face-piece respirator with organic vapour / gas cartridge.

Workers within the area around the application rig where splashes or exposure may occur to vapour or liquid spills:

- Cotton overalls buttoned to the neck and wrist and a washable hat;
➤ Chemical resistant apron;
➤ Elbow length neoprene gloves
➤ Chemical resistant footwear (not leather); and
➤ Full face-piece respirator with organic vapour / gas cartridge.

When prior entry is necessary into treated areas within 5 days of placement, or when odour persists beyond 5 days after treatment and entry is required:

➤ Cotton overalls buttoned to the neck and wrist and a washable hat;
➤ Elbow length neoprene gloves
➤ Chemical resistant footwear (not leather); and
➤ Full face-piece respirator with organic vapour / gas cartridge.

Taking care of PPE
PPE must be issued to everyone who is involved in the fumigation task or in areas adjacent to the site of fumigation. Each person should be issued a set of equipment and be responsible for looking after it. This involves having appropriate storage and maintenance procedures for PPE.

Safe storage
Storing your PPE in a locker is the easiest way to keep it clean and protect it from damage. The location of this locker is important to ensure your PPE remains clean and in good order.

Requirements for a PPE storage area:

➤ It must be locked away from chemicals so they don’t contaminate the equipment;
➤ It must be a cool, dry place;
➤ A personal locker should be provided for each staff member involved in fumigation; and
➤ A log of PPE issue and use must be kept in the storage area (detailing the items of PPE issued to each staff member and a record of each time it is used).

Remember!

Make sure you know the history of an item of PPE before you use it. The previous owner may not have been as careful about hygiene as you are. Old or worn-out PPE should be disposed of – your life could depend on it one day!

Some items have some specific storage requirements:

➤ Respirators must be stored in a sealed plastic bag or container to ensure they are kept clean between uses; and
Respirator cartridges should be removed from the respirator and kept in a sealed plastic bag when not in use.

**Maintaining your personal protective equipment**

Like all of your fumigation equipment, PPE requires maintenance. It is important that it is always in top working order and ready for use each time you wish to fumigate. If PPE is not in good condition it will not provide the level of protection you require. It may even be dangerous!

Always check the manufacturer’s instructions for each item of PPE, these should provide useful maintenance suggestions.

**Full face-piece respirator:**

- Check for ‘facial fit’ before every use (see: *Respirator facial fit test*);
- Clean with warm, soapy water and dry after each use;
- Check all washers and gaskets are in place (e.g. seals between the cartridge and respirator);
- Check for damage to lens seal, securing straps or body of respirator.

**Respirator cartridge:**

- Keep a ‘log label’ (see: *Respirator cartridge log label*) on your cartridge detailing the time it has been in use;
- Dispose of cartridges that exceed their hours of use;
- Dispose of cartridges that have been damaged in any way; Dispose of the cartridge if it gets wet.

**Coveralls / hat:**

- Wash after every use (wash your PPE separately to your normal clothing);
- Check for rips, tears or warn patches.

**Gloves / chemical resistant apron:**

- Wash after use in warm, soapy water;
- Check for rips, tears or worn patches.

**Chemical resistant footwear:**

- Wash exterior of footwear after each use;
- Do not re-use until thoroughly aired.

**Remember!**

A good method to make sure you keep up with your PPE maintenance requirements is to have a maintenance checklist on your locker. This could also include reminders about the appropriate method of storage for each item.
Respirator facial fit test
The facial fit test is a method of assessing if the respirator mask seals against your face. If the shape and size do not suit the shape of your face, gas may be entering the mask. You need to perform this test prior to every use of your respirator.

Test the facial fit of your respirator:

- Place the respirator (with cartridge attached) against your face in the normal position you would wear it (do not secure it with the fitting straps);
- Close the inlet valve of the cartridge with the cap supplied by the manufacturer or the palm of your hand;
- Inhale deeply; the vacuum created should cause the face piece to stick to your face for about 15 seconds;
- If the respirator holds in place for 15 seconds the facial fit is good;
- If the respirator will not seal on your face the seal is not sufficient to provide adequate protection – replace the respirator (with one that passes your facial fit test).

Respirator cartridge log label
You will recall that the organic vapour / gas cartridge filters the toxic compounds from the air that you inhale during fumigation. With use, the cartridge will eventually become clogged with the compounds it is filtering out of the air. You will need to replace the cartridge before it becomes ineffective as a filter, otherwise you could end up inhaling toxic fumes.

The ‘log label’ helps you to remember the period of time that the cartridge has been used in environments that may contain Telone Blends or Rural InLine. A simple and effective method of keeping a cartridge log is to place a sticky label on a blank portion of the cartridge on which you can record use information.

On your cartridge log you should record:

- The date the cartridge was first opened (top seal is removed);
- The date of the first removal of the bottom seal; and
- The time the cartridge is used in areas where Telone Blends or Rural InLine may be present (record in minutes).

When to dispose of your cartridge:

- Before you reach the maximum exposure time recommended by the manufacturer;
- If the cartridge is damaged or gets wet;
- If you find it hard to inhale when using the cartridge; and
- Any time you smell Telone Blends or Rural InLine when using the mask.
### Legislative Requirements for users of fumigants in Australia

#### Western Australia

**Definitions**
- **Fumigant** – means a registered pesticide that contains one or more of the following active constituents:
  - 1,3-Dichloropropene
  - Ethanedinitrile
  - Ethyl Formate
  - Ethylene Dibromide
  - Ethylene Oxide
  - Methyl Bromide
  - Phosphine
  - Sulfuryl Fluoride

**Fumigation** – means a pest management treatment that involves the use of a fumigant in a gaseous form.

**Exclusion:** The only fumigations the person undertakes on land owned or occupied by the person using a registered fumigant and the person is approved by the EDPH as competent to undertake soil fumigations.

A person must not act as a pest management technician unless they are licensed or the person is exempt.

A person must not act as a pest management salesperson unless the person does so in accordance with a licence. CPPMT3006A – Apply Pesticides to Manage Pests must be completed to gain a licence.

To use the soil fumigants Telone C-35, Telone C-60 and Rural InLine you must complete a stewardship course with the manufacturer.

#### South Australia

**Regulation 25 of the Controlled Substances (Poisons) Regulations** states: Poisons covered by Section 22 of the Act are:
- Acrolein
- Arsenic as an S7 poison
- Chloropicrin
- Cyanides as S7 poison
- Cyanogen
- DDT
- Fluoroacetamide
- Fluoroacetic acid
- Hydrocyanic acid as an S7 Poison
- Methyl Bromide
- Mirex
- Sodium fluoroacetate
- Strychnine as an S7 poison
- Thallium

**Regulation 25 Licence Conditions** may include but are not limited to:
- Specifying persons who can have access to the poison
- Storage
- Security

A person must not carry on a pest control business unless they hold a South Australian Pest Controller’s Licence, a Tasmanian Commercial Operator’s Licence, or are registered in Western Australia as a Commercial Pesticide Firm.

A person must not perform, or be required by a pest control business to perform, pest control work unless they hold a current Pest Management Licence.

The licensing authority may exempt a person from holding a licence on such conditions as it thinks fit once satisfied it will not entail any significant risk to public health or the environment and, by notice in writing, vary or revoke the exemption.

A person who fails to comply with a condition of an exemption is guilty of an offence.
## DEFINITIONS
- To prevent unauthorised access
- Provisions to contain any accidental spillage or leakage that may occur

**Examples of S7 soil fumigants covered by Regulation 25** are:
- Telone C-35
- Telone C-60
- Rural InLine

## REQUIREMENTS
- Technician Licence.
- The holder of a Limited Pest Management Technician’s Licence must notify the licensing authority if they cease employment as a pest management technician, or change employment to another pest controller, within 14 days.

A **Regulation 25 Licence to possess** is required to purchase covered poisons and may be issued to a person aged over 18 who has a valid reason for requiring the poison, and must be produced for sellers to see when purchasing.

To obtain a **Regulation 25 licence** you must have undertaken appropriate training – CPPPMT3011A Conduct Fumigation.

## NEW SOUTH WALES
**A Fumigator Licence** is only required for using products that contain the following fumigants:
- Methyl Bromide
- Phosphine
- Ethylene Oxide (except single dose canisters)
- Ethylene Dichloride
- Carbon Disulphide
- Chloropicrin
- Hydrogen Cyanide

A person must not use, or employ or engage a person to use a pesticide, unless they are qualified to use the pesticide, to conduct or work in a business, educational institution or hospital; for the landlord of any premises; for a public authority; for pest control on a golf course, sport field or bowling green; or for any agricultural or forestry operations.

Farmers do not need a licence to use or apply aluminium phosphide tablets or chloropicrin fumigants in agriculture.

**Note:** agriculture includes horticulture, growing fruit or vegetables and the use of land for animal husbandry such as keeping or breeding livestock, poultry or bees.
## Appendix 1

### Telone Blends and Rural InLine

**Guide to Application**

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<thead>
<tr>
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<tbody>
<tr>
<td><strong>QUEENSLAND</strong></td>
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</tbody>
</table>
| A **Fumigant** is a substance capable of producing a gas or vapour that is ordinarily used to kill a pest or sterilise grain or seed to prevent germination. A substance will be deemed to be a fumigant if:  
- It fits the definition  
- It is ordinarily used as a fumigant  
- Performs another function prescribed under a regulation | Fumigants must be registered by the APVMA.  
A person must not carry out a pest management activity unless they are a licensed pest management technician for the activity, or a trainee being supervised by a pest management technician licensed for that activity.  
Only an individual may apply for a licence. | The legislation does not apply to agricultural, horticultural and pastoral or to some domestic activities.  
Example of an activity not regulated by the Act:  
A pest control activity that is carried out on a farm in primary production (e.g. fumigating a farm grain storage facility). |
| **VICTORIA** |
| A **Pest Control Operator** is a person who conducts, or portrays themselves in anyway as conducting, the business of controlling, destroying or repelling pests.  
**Restricted Use Chemicals** are agricultural products that:  
- Are Schedule 7 Poisons (Dangerous Poisons)  
- Contain Atrazine  
- Contain Metham Sodium  
- Contain Ester formulations of 2,4-D, 2,4-DB, MCPA or Triclopyr | A Pest Control Operator must not use any pesticide or class of pesticide unless authorised on their pest control licence.  
To apply for a Pest Control Licence you must:  
- Be at least 18 years of age  
- Have the prescribed qualifications  
- Have paid the relevant licence fee  
A person licensed to use pesticides who lives interstate must apply for an Interstate Operator Licence to apply pesticides as a Pest Control Operator in Victoria.  
To use ‘restricted use’ chemicals, a person must hold an ACUP (or be under the direct supervision of an ACUP holder), PCRL (Pilot [Chemical Rating])  
| The requirement to hold a licence does not apply if the use of the pesticide is for one or more of the following purposes:  
- Horticulture  
- Agriculture treatment  
- Weed control  
- Controlling a pest animal to protect an area or place which is not a commercial building or a domestic, or adjacent to domestic, premises |
Appendix 1

DEFINITIONS

- **Fumigation**
- **Pindone Concentrate** – authorises the supply and use of agricultural chemicals that contain pindone concentrate for the preparation of poison baits (>2.5% pindone).
- Different combinations of the endorsements are available.

REQUIREMENTS

- Licence, PCOL (Pest Control Operator Licence), COL (Commercial Operator Licence) or working under a COL.
- **ACUP Training Requirements Standard** – A course in Agvet chemical user (or equivalent) that includes the units:
  - **AHCCHM303A** Prepare and apply chemicals and either
  - **AHCCHM201A** Apply chemicals under supervision or
  - **AHCCHM204A** Transport, handle and store chemicals
- **Fumigants** – CPPPMT3011A Conduct Fumigation

EXEMPTIONS

References:

- WA Health (Pesticides) Regulations 2011
- SA Controlled Substance (Pesticide) Regulations 2003
- SA Controlled Substance (Poison) Regulations 2011
- QLD Pest Management Act 2001
- VIC Public Health and Wellbeing Act 2008
- NSW Pesticides Regulation 2009

Links:

Guide to Obtaining a WA Pest Management Technicians Licence (WA)

Licences to possess Regulation 25 Poisons (SA)
[https://www.sahealth.sa.gov.au/wps/wcm/connect/34e66b804064e13ea73db7a05d853418/1516-Info-Reg25-Poisons.pdf?MOD=AIPERES&CACHEID=34e66b804064e13ea73db7a05d853418](https://www.sahealth.sa.gov.au/wps/wcm/connect/34e66b804064e13ea73db7a05d853418/1516-Info-Reg25-Poisons.pdf?MOD=AIPERES&CACHEID=34e66b804064e13ea73db7a05d853418)

Application for a licence to possess regulation 25 Poisons (SA)

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Training Requirements for Pest Management Technician Licence and Fumigator Licence (NSW)

Environmental Health Branch - A Guide to What Pest Management Technicians in Queensland Need to Know (QLD)

Agricultural Chemical Use - DEPI licences and permits (VIC)

The ACUP system in Victoria (VIC)

Application for/renewal of an Agricultural Chemical User Permit (VIC)

Australian State & Territory regulatory controls on Schedule 7 poisons (Australian Government)
Soil Sampling procedure for plant parasitic nematodes

- Take moist or damp soil, but not wet. If the topsoil is dry, remove top dry layer before taking sample. Do not allow the sample to dry.

- Take soil sample from around the root zone. Always include roots in the sample whenever possible.

- Always take a representative sample of the field. For field crop, a sample for nematode analysis consists of about 500g soil taken from the mixture of 20-30 cores at the depth of 15-30cm.

- Place samples in closed plastic bags or other moisture-proof container. Always put samples in a cool place.

Delivering your samples for analysis

Soils samples to predict the nematode threshold density level despatched to an approved laboratory for extraction, identification and interpretation of the results.

Label samples with:

- Name and address of grower;

- Crop symptoms (include percentage of crop affected and a sketch of the diseased patch);

- Cropping history, fertiliser or herbicide application; and

- Any other relevant information.
Diagnostic laboratories in Australia which provide nematological services:

**Queensland:**
Biological Crop Protection Pty. Ltd.
3601 Moggill Road, Moggill, Qld., 4070
Ph: 07 3202 7419 Fax: 07 3202 8033

**Queensland Department of Primary Industries**
Meiers Road, Indooroopilly, Qld., 4068
Ph: 07 3896 9574 Fax: 07 3896 9533

**Victoria:**
Institute for Horticultural Development
Private Bag 15
Scoresby Business Centre, Vic., 3176
Ph: 03 9210 9356 Fax: 03 9800 3521

**South Australia**
South Australian Research and Development Institute
Plant Research Centre
GPO Box 397
Adelaide, SA, 5001
Ph: 08 8303 9355 Fax 08 8303 9323

**Western Australia**
Agriculture WA
South Perth WA 6151
Ph: 08 9368 3263 Fax: 08 9367 2625
Performing texture and soil moisture tests

Assessing the soil – Texture Test

- Take a small sample of the soil (enough to fit in the palm of your hand). Discard any gravel.
- Moisten it a little water and knead it until it feels consistent. The soil should be damp but not sticky in your hand.
- Look at the sample and see if sand is obvious or can be heard when you work it.
- Squeeze the sample to see if it will form a ball. If it does form a ball is it durable, or does it fall apart easily?
- Squeeze the soil between your thumb and forefinger with a sliding motion to try and form a ‘ribbon’. Note the length of ribbon that can be formed before it falls apart.

The information gathered from the texture test will help you to categorise the soil:

- **Light soils (e.g. course-textured sands, sandy loams and loams)**
  - Sand may be obvious at stage 3.
  - May or may not form a ball at stage 4. The ball is likely to crumble easily.
  - The ribbon will be short (6-30mm) or non-existent in many light soils.

- **Heavy soils (e.g. fine textured clay loams and clays or soils with a very high organic matter such as peats)**
  - No sand visible at stage 3.
  - Will form a spongy or firm ball at stage 4.
  - The ribbon will be longer (25-80mm) in heavy soils.

Testing soil moisture ‘the feel method’

Take a sample between 5-30cm deep.

- For coarse soils (sand and loamy sand), there must be enough moisture to allow formation of a weak ball when compressed in the hand. Due to soil texture, this ball is easily broken with little disturbance.
- In loamy, or medium textured soils (coarse sandy loam, sandy loam and fine sandy loam), a soil sample with the proper moisture content can be formed into a ball which holds together with moderate disturbance, but does not stick between the thumb and forefinger.
- Fine textured soils (clay loam, silty clay loam, sandy clay, silty clay, sandy clay loam and clay), should be pliable and not crumbly, but should not form a ribbon when compressed between the thumb and forefinger.
First Aid for Telone Blends and Rural InLine

Make yourself aware of the first aid requirements for exposure to Telone Blends and Rural InLine. It is essential, should someone be exposed to Telone Blends or Rural InLine, that you are prepared to provide an appropriate response.

While some information is provided with this course it is essential that you keep up-to-date with first aid information relating to Telone Blends and Rural InLine and seek professional advice should you have any questions.

What does the label say?

- If poisoning occurs, contact a doctor or Poisons Information Centre (Phone Australia: 131 126) and
- Remove from contaminated area. Apply artificial respiration if not breathing.

See Telone Blends and Rural InLine product label section: First Aid

Remember!

When considering your first aid response to an accident with Telone Blends or Rural InLine remember the basic principle of first aid – DR ABC

DR ABC

This Action Plan is a vital aid to the first aider in assessing whether the casualty has any life-threatening conditions and if any immediate first aid is necessary.

- D = check for DANGER: to you, to others, to casualty;
- R = check RESPONSE: is casualty conscious? Is casualty unconscious?
- A = AIRWAY: is airway clear of objects? Is airway open?
- B = check for BREATHING: is chest rising and falling? Can you hear casualty’s breathing? Can you feel the breath on your cheek?
- C = check for CIRCULATION: can you feel a pulse? Can you see any obvious signs of life?

What does the Label say?
(M)SDS information

**General:** Consult the National Poisons Information Centre (Phone: 13 11 26) or a Doctor in every case of suspected chemical poisoning. Never give fluids or induce vomiting if a patient is unconscious or convulsing regardless of cause of injury. If breathing difficulties occur seek medical attention immediately.

**Swallowed:** If swallowed, DO NOT induce vomiting. Give a glass of water. Seek medical advice immediately.

**Skin:** If on skin, remove contaminated clothing and wash skin thoroughly with soap and water.

**Eyes:** If in eyes, hold eyes open and flood with water for at least 15 minutes and see a doctor.

**Inhalation:** If affected, remove from contaminated area and apply artificial respiration if not breathing.

**Remember!**

In some states, licensed fumigators must have first aid qualifications. Check with your local authorities for your requirement.
Lettuce test for fumigant residues

**Note!** The success of the method depends on assessing germination 2-3 days after commencing the test.

### Setting up the germination test

- Half fill two glass jars with fumigated soil (label them ‘fumigated’). Collect these soil samples from two sites in the fumigated area and place each sample into a separate jar. Sample soil from underneath the plastic mulch or sealed surface with a trowel (within top 10cm). Secure lids firmly immediately after placing soil in the jars.
  
  **Note!** Take some soil from the lowest point of the treated area – residues here may be higher.

- Half fill two glass jars with non-fumigated soil in a similar manner to step 1 (label them ‘untreated’). Collect these soil samples from as near to the fumigated site as possible (e.g. from headlands), but not from between fumigated rows.

- Moisten a cotton wool square with water and place 20 lettuce seeds on it. Place the cotton square in one of the jars on top of the soil sample and re-secure the lid. Repeat the procedure for each jar. Store the jars out of the direct sunlight and temperature extremes (preferably keep at room temperature) for 2-3 days.

- After 2-3 days remove the cotton wool squares from each jar, count the number of germinated seeds and record this number. Also note the condition of the germinated seedlings. Follow the instructions on assessing the germination test to determine if strawberry planting can proceed. Inhibition of lettuce germination and/or burning of their root tips can indicate the presence of residues in fumigated soil.

### Procedure for assessing the germination test results

- If germination in any untreated jars is less than 15 or the root tips of seedlings show symptoms of burning (see instruction page) delay planting and repeat lettuces-test* immediately. Use a new packet of lettuce seed (variety Great Lakes) and collect the untreated soil further away from the fumigated site. If not, read on.

- If germination in any of the fumigated jars is less than 15 delay planting and repeat the lettuce-test* in one week.
  
  If not, read on.

- The lettuce-test shows no evidence of fumigant residues in your soil. Proceed with planting.
Figure 11: Set-up for a lettuce germination test to assess the presence of fumigant residues in soils.

**Remember!**

*Be sure to clean the jars thoroughly before the next test*
# State WorkCover Authority / WHS contact information

<table>
<thead>
<tr>
<th>State contact</th>
<th>Contact details</th>
</tr>
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</table>
| **ACT**           | **WorkSafe ACT**  
Telephone: (02) 6207 3000 Facsimile: (02) 6205 0336  
Email: worksafe@act.gov.au  
GPO Box 158  
Canberra City, ACT, 2601  
After hours emergencies: 0419 120 128  
**ACT WorkCover**  
Telephone: (02) 6207 3000 or (02) 6205 2000 |
| **Northern Territory** | **NT WorkSafe**  
Telephone: 1800 019 115 Fax: (08) 8999 5141  
Email: ntworksafe@nt.gov.au  
GPO Box 3200  
Darwin, NT, 0801  
**Workers Rehabilitation & Compensation**  
Telephone: 1800 250 173 Email: ntworksafe@nt.gov.au |
| **Victoria**      | **WorkSafe Victoria**  
Telephone: (03) 9641 1555 Fax: (03) 9641 1222  
Email: webmaster@worksafe.vic.gov.au  
Ground Floor, 222 Exhibition St.,  
Melbourne, VIC, 3000  
Advisory Service Telephone: (03) 9641 1444 or 1800 136 089 (toll free)  
24 Hr Workplace Emergency Telephone: 13 23 60  
**Victorian WorkCover Authority**  
Telephone: (03) 9565 9444 Fax: (03) 9565 9400  
37 Dunlop Rd.,  
Mulgrave, VIC, 3170 |
| **Tasmania**      | **WorkSafe Tasmania**  
Telephone: 1300 366 322 (within Tasmania) (03) 6166 4600 (outside Tasmania) Fax: (03) 6233 8338  
Email: wstinfo@justice.tas.gov.au  
PO Box 56  
Rosny Park, TAS, 7018  
**WorkCover Tasmania**  
Telephone: 1300 366 322 (within Tasmania) (03) 6166 4600 (outside Tasmania)  
Email: workcover@justice.tas.gov.au |
| **Queensland**    | **Workplace Health and Safety Queensland**  
Telephone: 1300 369 915 Fax: (07) 3247 4059  
PO Box 69  
Brisbane, QLD, 4001  
Incident Notification Telephone: 1300 369 915 Fax: (07) 3874 7730  
Email: whsq.aaa@justice.qld.gov.au |
<table>
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<th>Region</th>
<th>Organization</th>
<th>Telephone</th>
<th>Fax Number</th>
<th>Help Centre Telephone</th>
<th>Email Address</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Queensland</td>
<td>WorkCover Queensland</td>
<td>1300 362 128 Fax: 1300 651 387</td>
<td></td>
<td></td>
<td><a href="mailto:info@workcoverqld.com.au">info@workcoverqld.com.au</a></td>
<td>GPO Box 2459, Brisbane, QLD, 4001</td>
</tr>
<tr>
<td>South Australia</td>
<td>SafeWork SA</td>
<td>(08) 8303 0400 Fax: (08) 8204 9200</td>
<td>(08) 365 255</td>
<td></td>
<td><a href="mailto:help@safework.sa.gov.au">help@safework.sa.gov.au</a></td>
<td>GPO Box 465, Adelaide, SA, 5001</td>
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<td></td>
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<td></td>
<td></td>
<td>Serious Workplace Injury &amp; Incidents Telephone: 1800 777 209 (24hrs)</td>
</tr>
<tr>
<td></td>
<td>South Australia WorkCover Corporation</td>
<td>13 18 55</td>
<td></td>
<td></td>
<td><a href="mailto:info@workcover.com">info@workcover.com</a></td>
<td>GPO Box 2668, Adelaide, SA, 5001</td>
</tr>
<tr>
<td>Western Australia</td>
<td>WorkSafe WA</td>
<td>(08) 9327 8777 Fax: (08) 9321 8973</td>
<td>(08) 9321 8973</td>
<td>1300 307 877</td>
<td><a href="mailto:safety@commerce.wa.gov.au">safety@commerce.wa.gov.au</a></td>
<td>PO Box 294, West Perth, WA, 6872</td>
</tr>
<tr>
<td></td>
<td>WorkCover WA</td>
<td>(08) 9388 5555 Fax: (08) 9388 5550</td>
<td>(08) 9388 5550</td>
<td>1300 794 744</td>
<td></td>
<td>2 Bedbrook Place, Shenton Park, WA, 6008</td>
</tr>
<tr>
<td>New South Wales</td>
<td>WorkCover NSW (WHS &amp; Workcover Authority)</td>
<td>13 10 50 or (02) 4321 5000 Fax: (02) 4325 4145</td>
<td>(02) 4325 4145</td>
<td></td>
<td><a href="mailto:contact@workcover.nsa.gov.au">contact@workcover.nsa.gov.au</a></td>
<td>Locked Bag 2906, Lisanrow, NSW, 2252</td>
</tr>
<tr>
<td></td>
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<td>Report a death, dangerous incident or serious illness or injury: 13 10 50 24 hours / 7 days</td>
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</tbody>
</table>
### Pest Technician Licence Regulator Contact Information

<table>
<thead>
<tr>
<th>State</th>
<th>Contact details</th>
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</table>
| South Australia      | **SA Health** Level 1 CitiCentre, 11-13 Hindmarsh Square, Adelaide SA 5000  
Controlled Substance Licensing  
PO Box 287, Rundle Mall, Adelaide SA 5000  
Telephone: **08 8226 7117**  
Email: [controlled.substances@health.sa.gov.au](mailto:controlled.substances@health.sa.gov.au) |
| Tasmania             | **Dept. Primary Industries, Parks, Water and Environment**  
Licence Coordinator  
165 Westbury Rd, Prospect TAS 7250  
Telephone: **03 6777 2118**  
Email: [Maria.Hawksley@dpipwe.tas.gov.au](mailto:Maria.Hawksley@dpipwe.tas.gov.au) |
| Queensland           | **Queensland Health**  
**Drugs and Poisons Policy and Regulation Unit**  
Health Protection Unit  
GPO Box 2368, Fortitude Valley QLD 4006  
Telephone: **0703328 9310**  
Email: [HPU_Licensing@health.qld.gov.au](mailto:HPU_Licensing@health.qld.gov.au) |
| Western Australia    | **Dept. of Health**  
227 Stubbs Tce, Shenton Park WA 6008  
PO Box 8172, Perth Business Centre, WA 6849  
Telephone: **08 9388 4244 or 08 9388 4999**  
Email: [pesticidesafety@health.gov.au](mailto:pesticidesafety@health.gov.au) |
| Victoria             | **Dept. Health Victoria**  
Pest Control Program  
50 Lonsdale St, Melbourne VIC 3000  
Registration and Licensing  
GPO Box 4541, Melbourne VIC 3001  
Telephone: **03 9096 9000 or 1300 887 040**  
Email: [pestcontrol@health.vic.gov.au](mailto:pestcontrol@health.vic.gov.au) |
| New South Wales      | **WorkCover NSW**  
Head Office  
92-100 Donnison St, Gosford NSW 2250  
Licensing Team  
Locked Bag 2906, Lisarow NSW 2252  
Telephone: **02 4321 5929**  
Email:                                                                                   |
| Northern Territory   | **Dept. of Health**  
Head Office  
87 Mitchell St, Darwin NT 0800  
Medicines and Poison Control  
PO Box 40596, Casurina NT 0811  
Telephone: **08 8922 7341**  
Email: [poisonscontrol@nt.gov.au](mailto:poisonscontrol@nt.gov.au) |
## Agricultural Regulator Contact Information

<table>
<thead>
<tr>
<th>State</th>
<th>Contact details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>South Australia</strong></td>
<td>Primary Industries and Regions SA</td>
</tr>
<tr>
<td></td>
<td>Head Office</td>
</tr>
<tr>
<td></td>
<td>Level 14, 25 Grenfell St, Adelaide SA 5000</td>
</tr>
<tr>
<td></td>
<td>GPO Boxes 1671, Adelaide SA 5001</td>
</tr>
<tr>
<td></td>
<td>Telephone: <strong>08 8226 0900</strong></td>
</tr>
<tr>
<td></td>
<td>Internet Contact: <a href="http://www.pir.sa.gov.au">www.pir.sa.gov.au</a></td>
</tr>
<tr>
<td><strong>Tasmania</strong></td>
<td>Dept. Primary Industries, Parks, Water and Environment</td>
</tr>
<tr>
<td></td>
<td>1 Franklin Wharf, Hobart TAS 7000</td>
</tr>
<tr>
<td></td>
<td>GPO Box 44, Hobart TAS 7001</td>
</tr>
<tr>
<td></td>
<td>Telephone: <strong>1300 368 550</strong></td>
</tr>
<tr>
<td></td>
<td>Email: <a href="mailto:Internet.Coordinator@dpipwe.tas.gov.au">Internet.Coordinator@dpipwe.tas.gov.au</a></td>
</tr>
<tr>
<td><strong>Queensland</strong></td>
<td>Dept. Agriculture, Fisheries and Forestry</td>
</tr>
<tr>
<td></td>
<td>Central Office</td>
</tr>
<tr>
<td></td>
<td>Primary Industries Building, 80 Ann St, Brisbane QLD</td>
</tr>
<tr>
<td></td>
<td>GPO Box 46, Brisbane, QLD 4001</td>
</tr>
<tr>
<td></td>
<td>Telephone: <strong>13 2523</strong> or <strong>07 3404 6999</strong></td>
</tr>
<tr>
<td></td>
<td>Email: <a href="mailto:callweb@daff.qld.gov.au">callweb@daff.qld.gov.au</a></td>
</tr>
<tr>
<td><strong>Western Australia</strong></td>
<td>Dept. of Agriculture and Food</td>
</tr>
<tr>
<td></td>
<td>Head Office</td>
</tr>
<tr>
<td></td>
<td>3 Baron-Hay Court, South Perth WA 6151</td>
</tr>
<tr>
<td></td>
<td>Locked Bag 4 Bentley Delivery Centre WA 6983</td>
</tr>
<tr>
<td></td>
<td>Telephone: <strong>08 9368 3333</strong></td>
</tr>
<tr>
<td></td>
<td>Email: <a href="mailto:enquiries@agric.wa.gov.au">enquiries@agric.wa.gov.au</a></td>
</tr>
<tr>
<td><strong>Victoria</strong></td>
<td>Dept. of Environmental and Primary Industries</td>
</tr>
<tr>
<td></td>
<td>Head Office</td>
</tr>
<tr>
<td></td>
<td>8 Nicholson St, East Melbourne VIC</td>
</tr>
<tr>
<td></td>
<td>PO Box 500, Melbourne VIC 8002</td>
</tr>
<tr>
<td></td>
<td>Telephone: <strong>13 61 86</strong></td>
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<tr>
<td></td>
<td>Internet Contact: <a href="http://www.depi.vic.gov.au">www.depi.vic.gov.au</a></td>
</tr>
<tr>
<td><strong>New South Wales</strong></td>
<td>Dept. of Primary Industries</td>
</tr>
<tr>
<td></td>
<td>Head Office</td>
</tr>
<tr>
<td></td>
<td>161 Kite St, Orange NSW 2800</td>
</tr>
<tr>
<td></td>
<td>Locked Bag 21, Orange NSW 2800</td>
</tr>
<tr>
<td></td>
<td>Telephone: <strong>02 6391 3100</strong> or <strong>1800 808 095</strong></td>
</tr>
<tr>
<td></td>
<td>Email: <a href="mailto:nsw.agriculture@dpi.nsw.gov.au">nsw.agriculture@dpi.nsw.gov.au</a></td>
</tr>
<tr>
<td><strong>Northern Territory</strong></td>
<td>Dept. of Primary Industry and Fisheries</td>
</tr>
<tr>
<td></td>
<td>Berrimah Farm, Makagon Rd, Berrimah NT 0828</td>
</tr>
<tr>
<td></td>
<td>GPO Box 3000, Darwin NT 0801</td>
</tr>
<tr>
<td></td>
<td>Telephone: <strong>08 8999 5511</strong></td>
</tr>
<tr>
<td></td>
<td>Email: <a href="mailto:info@dpif@nt.gov.au">info@dpif@nt.gov.au</a></td>
</tr>
</tbody>
</table>
SAFETY DATA SHEET

RURAL TELONE C-35 SOIL FUMIGANT

Date Prepared: 8th December 2015
Replaces: 12th December 2011

1. IDENTIFICATION

Product Identifier: Rural Telone™ C-35 Soil Fumigant
Other Means of Identification: 1,3-Dichloropropene (1,3-D) and Chloropicrin (Trichloronitromethane, Nitrochloroform)
Uses: Soil Fumigant
Supplier Name: A-Gas Rural
Address: 24 Chamberlain St, Wingfield, SA, 5013
Telephone: (08) 8347 3838 (24 hours)
Email: info.rural@agas.com

2. HAZARDS IDENTIFICATION

Acute Toxicity – Inhalation, Category 1
Acute Toxicity – Oral, Category 3
Flammable Liquid, Category 3
Skin Corrosion/Irritation, Category 1A
Serious Eye Damage/Irritation, Category 1

GHS Hazard Phrases:
- H226: Flammable liquid and vapour
- H330: Fatal if Inhaled
- H301: Toxic if swallowed
- H314: Causes severe skin burns and eye damage
- H318: Causes serious eye damage
- H400: Very toxic to aquatic life

GHS Precaution Phrases:
- P210: Keep away from heat/sparks/open flames/hot surfaces – No smoking
- P233: Keep cylinder tightly closed
- P240: Ground/Bond cylinder and receiving equipment
- P241: Use explosion-proof electrical/ventilating/lighting equipment
- P242: Use only non-sparking tools
- P243: Take precautionary measures against static discharge
- P260: Do not breathe gas
- P270: Do not eat, drink or smoke when using this product
- P271: Use only outdoors in well ventilated areas
- P284: Wear respiratory protection
- P264: Wash hands, arms and face thoroughly after handling
- P280: Wear protective gloves and eye protection

GHS Response Phrases:
- P304 + P340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
- P310: Immediately call a POISON CENTRE or doctor/physician
- 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
- P363: Wash contaminated clothing before reuse
- P305 + P351 + P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing

GHS Storage and Disposal Phrases:
- Keep cool
- P405: Store locked up
- P501: Dispose of contents/cylinder by returning to supplier

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SAFETY DATA SHEET

RURAL TELONE C-35 SOIL FUMIGANT

Date Prepared: 8th December 2015
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Classified as HAZARDOUS according to the criteria of NOHSC
Classified as DANGEROUS GOODS for Land and Marine Transport (See Section 14)

3. COMPOSITION/INGREDIENTS

<table>
<thead>
<tr>
<th>Identity (Other Names)</th>
<th>CAS Number</th>
<th>Proportion</th>
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<tbody>
<tr>
<td>1,3-Dichloropropene</td>
<td>000542-75-6</td>
<td>63.4%</td>
</tr>
<tr>
<td>Chloropicrin</td>
<td>000076-06-2</td>
<td>34.7%</td>
</tr>
<tr>
<td>Balance not contributing to hazard</td>
<td></td>
<td>1.9%</td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES

Consult the Poisons Information Centre (13 11 26) or a doctor in every case of suspected chemical poisoning. Never give fluids or induce vomiting if a patient is unconscious or convulsing regardless of cause of injury. If breathing difficulties occur seek medical attention immediately.

Swallowed: Call the Poisons Information Centre or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by the Poisons Information Centre or doctor. Never give anything by mouth to an unconscious person.

In Eye: Wash immediately and continuously with flowing water for at least 30 minutes. Remove contact lenses after the first 5 minutes and continue washing. Obtain prompt medical attention, preferably from an ophthalmologist.

On Skin: Immediate continued and thorough washing in flowing water for at least 30 minutes is imperative while removing contaminated clothing. Prompt medical attention is essential. Wash clothing before reuse. Destroy contaminated leather items.

Inhaled: Move person to fresh air. If person is not breathing, call 000 or an ambulance, and then give artificial respiration; if by mouth to mouth use rescuer protection (pocket mask, etc.) If breathing is difficult, oxygen should be administered by qualified personnel.

Advice to Doctor: Due to irritant properties, swallowing may result in burns/ ulceration of mouth, stomach, and lower gastrointestinal tract with subsequent stricture. Aspiration of vomitus may cause lung injury. Suggest endotracheal/ oesophageal control if lavage is done. Respiratory symptoms, including pulmonary oedema, may be delayed. Persons receiving significant exposure should be observed 24-48 hours for signs of respiratory distress. Maintain adequate ventilation and oxygenation of the patient. May cause respiratory sensitisation or asthma-like symptoms. Bronchodilators, expectorants and antitussives may be of help. Excessive exposure may aggravate pre-existing asthma and other respiratory disorders (e.g. emphysema, bronchitis, reactive airways dysfunction syndrome). Treat bronchospasm with inhaled beta2 agonist and oral or parenteral corticosteroids. Methemoglobinemia may aggravate any pre-existing condition sensitive to a decrease in available oxygen, such as chronic lung disease, coronary artery disease or anaemia. If burn is present, treat as any thermal burn, after decontamination.

Pre-existing Conditions: Persons using Telone C-35 should have a medical examination (especially respiratory system and skin) prior to use to detect pre-existing conditions that might place them at increased risk and to establish a baseline for future health monitoring. Persons with impaired respiratory functions may be at increased risk from exposure to Chloropicrin.

5. FIRE FIGHTING MEASURES

Extinguishing Media: Water fog or fine spray, carbon dioxide, dry chemical, or foam. Water fog, applied gently, may be used as a blanket for extinguishing fire. General purpose synthetic foams (including AFF type) or protein foams are preferred if available. Alcohol resistant foams (ATC type) may
SAFETY DATA SHEET

RURAL TELONE C-35 SOIL FUMIGANT

Date Prepared: 8th December 2015
Replaces: 12th December 2011

Fire and Explosion Hazards:
Vapours are heavier than air and may travel a long distance and accumulate in low laying areas. Product can decompose at elevated temperatures. The generation of gas during decomposition can cause pressure in closed systems. Pressure build up can be rapid. Cylinders may rupture violently in a fire. Withdraw all personnel from area if discoloration of the cylinder is noted. Hazardous combustion products may include but are not limited to nitrogen oxides, hydrogen chloride, hydrocarbons, carbon monoxide, and carbon dioxide. Fire water run-off, if not contained, may cause environmental damage. Move container from fire area if this is possible without hazard. Vapours are heavier than air and may travel a long distance and accumulate in low lying areas. Hazardous combustion products may include but not limited to nitrogen oxides, hydrogen chloride, hydrocarbons, carbon monoxide, and carbon dioxide.

Precautions for Fire Fighters:
Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire-fighting clothing (including fire-fighting helmet, coat, pants, boots, and gloves). Avoid contact with this material during fire-fighting operations. If contact is likely, change to full chemical resistant clothing with SCBA. If this will not provide sufficient fire protection; consider fighting fire from a remote location. Consider use of unmanned hose holder or monitor nozzles. For protective equipment in post-fire or non-fire clean-up situations, refer to the relevant sections.

Hazchem Code: 2WE

6. ACCIDENTAL RELEASE MEASURES

Emergency Procedures: Extinguish all ignition sources in the vicinity of the spill or released vapour to avoid fire or explosion. Evacuate enclosed areas and keep bystanders out of low lying areas and move them upwind to open areas. Wear respiratory protection (self-contained purifying respirator (PAPR) equipped with Type A cartridges), a face shield or goggles, overalls buttoned to neck and wrist, chemical resistant gloves and boots. In addition, body protection providing gas-tight protection is required to prevent possible skin effects.

Containment of Spill: Only trained and properly protected personnel must be involved in clean-up operations. If it can be done safely, invert or reposition the leaking container of Telone C-35 so that the area with the leak is up and the flow reduced. If possible, put the container into an overpak. Cover or confine the leakage with an absorbent such as vermiculite, clay, sand, or other non-combustible absorptive material. Collect the spent absorbent material is a disposal drum. If the spill is on the ground, dig up enough of the soil to eliminate the contamination and place the soil in a disposal drum.

Large spills/leaks: Bund the area of large spills and report them to A-Gas Rural by phone on (08) 8347 3838 (24 Hours). Wear personal protective equipment (see section 8). Warn public of downwind explosion hazard. Keep out of sewers.

7. HANDLING AND STORAGE

Precautions for Safe Handling: Keep out of reach of children. Do not swallow. Avoid breathing vapour or mist. Avoid contact with eyes, skin and clothing. Use with adequate ventilation. Wash thoroughly after handling. Keep cylinder closed. Cylinders, even those that have been emptied, can contain vapours. Do not cut, drill, grind, weld, or perform similar operations on or near empty containers. Use of non-sparking or explosion proof equipment may be necessary, depending on the type of operation. Keep away from heat, sparks, and flames. Never use air pressure for transferring product. No smoking, open flames or sources of ignition in handling and storage areas. Vapours...
SAFETY DATA SHEET
RURAL TELONE C-35 SOIL FUMIGANT

Date Prepared: 8th December 2015
Replaces: 12th December 2011

are heavier than air and may travel a long distance and accumulate in low lying areas. Ignition and/or flashback may occur. Electrically bond and ground all containers and equipment before transfer or use of material. Do not enter confined spaces unless adequately ventilated.

Conditions for Safe Storage: Store cylinders upright in cool, well-ventilated locked storage preferably outside or detached from other buildings. Minimise sources of ignition, such as static build-up, heat, spark or flame. Flammable mixtures may exist within the vapour space of containers at room temperature. Do not store near or with oxidising materials. Be sure cylinder is closed completely.

Special Precautions: Do not use magnesium, aluminium or their alloys for handling equipment or cylinders. Be sure cylinder is closed completely.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

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

Exposure Limits: 1,3-Dichloropropene: NOHSC TWA 1 ppm (4.5 mg/m$^3$), Skin. Carcinogen category 3, skin. Chloropicrin: NOHSC TWA 0.1 ppm (0.67 mg/m$^3$).

A ‘skin’ notation following the exposure guideline refers to the potential for dermal absorption of the material including mucous membranes and the eyes either by contact with vapours or by direct skin contact. It is intended to alert the reader that inhalation may not be the only route of exposure and that measures to minimise dermal exposures should be considered.

Engineering Controls: Provide general and/or local exhaust ventilation to control airborne levels below the exposure guidelines. Lethal concentrations may exist in areas with poor ventilation, including low lying areas.

RECOMMENDATIONS FOR MANUFACTURING, COMMERCIAL BLENDING, AND PACKAGING WORKERS:

Personal Protective Equipment: Respiratory Protection: Atmospheric levels should be maintained below the exposure guideline. When respiratory protection is required, use an approved self-contained breathing apparatus or positive pressure airline with auxiliary self-contained air supply.

Protective Gloves: Potentially fatal if absorbed through the skin. Impermeable protective gloves must be worn when using. For help in selecting suitable equipment, consult AS 2161.

Eye Protection: Use chemical goggles. Wear a face-shield, which allows use of chemical goggles, or wear full face respirator, to protect face and eyes when there is any likelihood of splashes. Eye wash fountain/equipment should be located in immediate work area. If exposure causes eye discomfort, use a full face respirator.

Clothing: Use protective clothing chemically resistant to this material. Selection of specific items such as face shield, gloves, boots, apron, or full-body suit will depend on operation. A safety shower, or emergency washing facilities, should be located in the immediate work area. Remove contaminated clothing immediately, wash skin area with soap and water, and launder clothing before reuse or dispose of properly. Items, which cannot be decontaminated, such as shoes, belts, and watchbands should be removed and disposed of properly. If hands are cut or scratched, use chemical resistant gloves even for brief exposures.

Safety Boots: Wearing safety boots in industrial situations is advised.
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APPLICATORS AND ALL OTHER HANDLERS:

Wear cotton overalls buttoned to the neck and wrist and a washable hat, chemical resistant apron, elbow length neoprene gloves, chemical resistant footwear (non-sparking rubber boots – not steel capped) and full face respirator with organic vapour/gas cartridge or canister.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Straw-coloured liquid
Odour: Irritating odour
Vapour Pressure: Approx. 30 mmHg @ 20ºC (moderately volatile)
Boiling Point: 200ºF (93ºC)
Freezing Point: -120ºF (-85ºC)
Solubility in Water: 0.2g/100g
Specific Gravity/Density: 1.34 @ 23ºC
Flash Point: 49ºC (PMCC)
Saturated Vapour Concentration: 160.4 ml/m³ @ 25ºC

10. STABILITY AND REACTIVITY

Chemical Stability and Conditions to Avoid: Unstable at elevated temperatures. Avoid moisture, open flames, welding arcs, or other high temperature sources, which induce thermal decomposition. Generation of gas during decomposition can cause pressure in closed systems. Pressure build up can be rapid.

Incompatible Materials: Moisture – Corrosive when wet. Reaction with water can generate gases and acids. Avoid contact with amines and strong bases, oxidising materials, metals such as zinc, cadmium, and magnesium and/or absorbent materials such as organic absorbents.

Hazardous Decomposition Products: Depends on the temperature, air supply and the presence of other materials. Hazardous combustion products may include but are not limited to nitrogen oxides, hydrogen chloride, hydrocarbons, carbon monoxide, and carbon dioxide.

Polymerisation: Not known to occur.

11. TOXICOLOGICAL INFORMATION

ACUTE Potential Health Effects: This section includes possible adverse effects, which could occur if this material is not handled in the recommended manner.

Swallowed: Moderate toxicity if swallowed. The oral LD₅₀ for rats is > 100 (males) and 100-200 (females) mg/kg. Small amounts swallowed incidental to normal handling operations are not likely to cause injury; however, swallowing larger amounts may cause serious injury, even death. Aspiration into the lungs may occur during ingestion or vomiting, resulting in rapid absorption and injury to other body systems. Swallowing may result in gastrointestinal irritation or ulceration.

In Eyes: May cause severe eye irritation with corneal injury, which may result in permanent impairment of vision, even blindness. Chemical burns may occur. Vapours may cause lacrimation (tears) and eye irritation may be experienced as mild discomfort and redness.

On Skin: Brief contact may cause severe skin burns. Symptoms may include pain, severe local redness, and tissue damage. Prolonged or widespread skin contact may result in absorption of harmful amounts. The LD₅₀ for skin absorption in rabbits is between 907 (males) and > 1000 (females)

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mg/kg. Classified as corrosive to the skin. Vapour may cause skin irritation. May cause more severe response if skin is abraded (scratched or cut). Skin contact may cause an allergic reaction in a small proportion of individuals.

Inhaled: Brief exposure (minutes) to easily attainable concentrations may cause serious adverse effects, even death. Excessive exposure may cause severe irritation to upper respiratory tract (nose and throat) and lungs. Excessive exposure to Chloropicrin may cause lung injury. May cause allergic respiratory response. Excessive exposure may cause Methemoglobinemia, thereby impairing the blood’s ability to transport oxygen. May cause central nervous system effects and nausea or vomiting. Chloropicrin has also caused weak/irregular heart action and muscle damage upon severe exposure.

CHRONIC
Reproductive Effects: For the major components, Chloropicrin and 1,3-Dichloropropene, did not interfere with reproduction in animal studies.

Teratogenic Effects: Birth defects are unlikely. Even exposures having an adverse effect on the mother should have no effect on the foetus.

Mutagenic Effects: For the component 1.3-Dichloropropene, in-vitro toxicity studies were negative in some cases and positive in other cases. Animal genetic toxicity studies were negative. For Chloropicrin, in-vitro genetic toxicity studies were negative in some cases and positive in other cases. Animal genetic toxicity studies were inconclusive.

Carcinogenic Effects: 1,3-D has been shown to cause cancer in laboratory animals by the oral route when the dose exceeds the body’s defence mechanisms. Inhalation exposure resulted in an increase in the normal occurrence of benign lung tumours in male mice. Not classified as a carcinogen by the Australian Advisory Committee on Chemicals Scheduling under normal conditions of exposure. 1,3-Dichloropropene is listed as a potential carcinogen for hazard communication purposes under the National Exposure Standards for Atmospheric Contaminants under the Occupational Environment [NOHSC:1003 (1995)].

12. ECOLOGICAL INFORMATION

Movement and Partitioning: 1,3-Dichloropropene

Mobility in soil: Potential for mobility in soil is very high (Koc between 0 and 50).


Bioaccumulation: Bioconcentration potential is low (BCF < 100 or Log Pow < 3).

Partition coefficient, n-octanol/water (Koc): 2.06 Measured

Chloropicrin

Mobility in soil: Potential for mobility in soil is very high (Koc between 0 and 50)


Henry’s Law Constant (H): 2.05E-03 atm*m^3/mole; 25°C Measured.

Distribution in Environment: Mackay Level 1 Fugacity Model:

<table>
<thead>
<tr>
<th>Air</th>
<th>Water</th>
<th>Biota</th>
<th>Soil</th>
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<tbody>
<tr>
<td>96.94%</td>
<td>2.76%</td>
<td>&lt;0.01%</td>
<td>0.28%</td>
<td>&lt;0.01%</td>
</tr>
</tbody>
</table>

Ecotoxicity: Material is highly toxic to aquatic invertebrates on an acute basis (LC50 or EC50 is < 1 mg/L in most sensitive species tested).

Fish Acute and Prolonged Toxicity

LC50, rainbow trout (oncorhynchus mykiss), 96 h: 2.78 – 4.63 mg/L

LC50, sheepshead minnow (cyprinodon variegatus), 96 h: 0.91 mg/L
Appendix 9

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RURAL TELONE C-35 SOIL FUMIGANT

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Aquatic Invertebrate Acute Toxicity
EC$_{90}$ eastern oyster (crassostrea virginica), 96 h shell growth inhibition: 0.67 mg/L

Aquatic Plant Toxicity
EbC$_{50}$ diatom navicular sp., biomass growth inhibition, 120 h: 0.29 mg/L
EbC$_{50}$ duckweed lemma sp., biomass growth inhibition, 14 h: 3.60 mg/L

Fish Chronic Toxicity Value (ChV)
fish, flow-through, 33 d, survival, LC$_{50}$, NOEC: 0.117 mg/L, LOEC: 0.204 mg/L

Aquatic Invertebrates Chronic Toxicity Value
water flea daphnia magna, 21 d, number of offspring, EC$_{50}$, NOEC: 0.073 mg/L, LOEC: 0.109 mg/L

Toxicity to Above Ground Organisms
oral LD$_{50}$, bobwhite (colinus virginianus): 152 mg/kg bodyweight
dietary LC$_{50}$, bobwhite (colinus virginianus): > 5620 mg/kg diet
LC$_{50}$, honey bee (apis mellifera): 18097 mg/m$^3$

Persistence / Degradability:
- Degradation is expected in the atmospheric environment within minutes to weeks
- Degradation is expected in the soil environment within days to weeks
- 1.3-Dichloropropene has a stratospheric ozone depletion potential (ODP) of 0.02, relative to CFC 12 (ODP=1)

Based largely or completely on information for chloropicrin. Chloropicrin degrades to carbon dioxide in soil with a half-life between 8 hours and 4.5 days. In water, Chloropicrin degrades to carbon dioxide, bicarbonate, chloride, nitrate and nitrite within 32 hours when exposed to light. Half-life in air when exposed to simulated sunlight was 20 days with the end products being phosgene, nitric oxide, chlorine, nitrogen dioxide and dinitrogen tetroxide.

13. DISPOSAL CONSIDERATIONS
Disposal Methods: Empty cylinders should have all valves closed and be returned to the point of sale. Do not use empty containers to store any other material.
If wastes and/or containers cannot be disposed of according to the product label directions, disposal of this material must be in accordance with your local or area regulatory authorities.

14. TRANSPORT INFORMATION

UN Number: 3390
Proper Shipping Name: TOXIC BY INHALATION, LIQUID, CORROSIVE, N.O.S. (CHLOROPICRIN AND 1,3-DICHLOROPROPENE)
DG Class (Subsidiary Risk): 6.1 (3) (8)
Packaging Group: I
Marine Pollutant: Yes
Hazchem Code: 2WE

15. REGULATORY INFORMATION
Poison Scheduling: S7
Registration/Notification: APVMA Product No. 54436

16. OTHER INFORMATION
Glossary
ACGIH: American Conference of Governmental Industrial Hygienists
BCF: Bioconcentration Factor – a measure for the characterisation of the accumulation of a chemical in an organism.
It is defined as the concentration of a chemical in an organism (plants, microorganisms, animals) divided by the

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concentration in a reference compartment (e.g. food, surrounding water)

BOD: Biochemical oxygen demand – the amount of oxygen required by aerobic microorganisms to decompose the organic matter in a sample of water, such as that polluted by sewage. It is used as a measure of the degree of water pollution. Also called biological oxygen demand.

ECso: median effective concentration. Statistically derived concentration of a substance in an environmental medium expected to produce a certain effect in 50% of test organisms in a given population under a defined set of conditions

EEL: Environmental exposure standard set by ERMA

Explosive Limits: The range of concentrations (% by volume in air) of a flammable gas or vapour that can result in an explosion or ignition in a confined space

Koc: the organic carbon petition coefficient (mL soil water / g organic carbon)

Kow: See Pow

LCso: Lethal concentration 50%. A concentration of chemical in air or water that will kill 50% of the test organisms

LDso: Lethal dose 50%. The doses of chemical that will kill 50% of the test animals receiving it.

NOSHC: National Occupational Health and Safety Commission of Australia, now SafeWork Australia

PEL: Permissible exposure level, a maximum allowable exposure level by law

Polymerisation: a chemical reaction in which small molecules (monomers) combine to form much larger molecules (polymers). A hazardous polymerisation reaction is one that occurs at a fast rate and releases large amounts of energy

Pow: the octanol-water partition coefficient is the ratio of the concentration of a chemical in octanol and in water at equilibrium and at a specified temperature. Octanol is an organic solvent that is used as a surrogate for natural organic matter. This parameter is used in many environmental studies to help determine the fate of chemicals in the environment.

STEL: Short term exposure limit. A term used to indicate the maximum average concentration allowed for a continuous 15 minute exposure period.

TLV: Threshold Limit Value, an exposure limit set by a competent authority

TWA: Time Weighted Average. The average concentration of a chemical in air over the total exposure time – usually an 8 hour working day

References
AS/NZS 1715-2009 Selection Use and Maintenance of Respiratory Protective Devices
AS/NZS 1716-2012 Respiratory Protective Devices
Australian Dangerous Goods Code
International Maritime Dangerous Goods Code
International Air Transport Association (IATA) Dangerous Goods Regulation
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Please read the label carefully before using this product.

CHANGE REGISTER

<table>
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<tr>
<th>Revision Date</th>
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<tbody>
<tr>
<td>8 December 2015</td>
<td>2. HAZARD IDENTIFICATION – Hazard, Risk and Safety Phrases update in line with GHS</td>
</tr>
<tr>
<td></td>
<td>ALL SECTIONS – Update to current references &amp; Format change</td>
</tr>
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## 1. IDENTIFICATION

<table>
<thead>
<tr>
<th>Product Identifier:</th>
<th>Rural InLine Soil Fumigant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other Means of Identification:</td>
<td>1,3-Dichloropropene (1,3-D) and Chloropicrin (Trichloronitromethane, Nitrochloroform)</td>
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<tr>
<td>Uses:</td>
<td>Soil Fumigant</td>
</tr>
<tr>
<td>Supplier Name:</td>
<td>A-Gas Rural</td>
</tr>
<tr>
<td>Address:</td>
<td>24 Chamberlain St, Wingfield, SA, 5013</td>
</tr>
<tr>
<td>Telephone:</td>
<td>(08) 8347 3838 (24 hours)</td>
</tr>
<tr>
<td>Email:</td>
<td><a href="mailto:info.rural@agas.com">info.rural@agas.com</a></td>
</tr>
</tbody>
</table>

## 2. HAZARDS IDENTIFICATION

**Acute Toxicity – Inhalation, Category 1 and 2**

**Acute Toxicity – Oral, Category 3**

**Flammable Liquid, Category 1**

**Skin Corrosion/Irritation, Category 1A to 1C**

**Serious Eye Damage/Irritation, Category 1**

**GHS Hazard Phrases:**

- H224: Extremely flammable liquid and vapour
- H330: Fatal if Inhaled
- H301: Toxic if swallowed or in contact with skin
- H314: Causes severe skin burns and eye damage
- H318: Causes serious eye damage
- H335: May cause respiratory irritation
- H351: Suspected of causing cancer
- H400: Very toxic to aquatic life

**GHS Precaution Phrases:**

- P210: Keep away from heat/sparks/open flames/hot surfaces – No smoking
- P233: Keep cylinder tightly closed
- P240: Ground/Bond cylinder and receiving equipment
- P241: Use explosion-proof electrical/ventilating/lighting equipment
- P242: Use only non-sparking tools
- P243: Take precautionary measures against static discharge
- P260: Do not breathe gas
- P270: Do not eat, drink or smoke when using this product
- P271: Use only outdoors in well ventilated areas
- P284: Wear respiratory protection
- P264: Wash hands, arms and face thoroughly after handling
- P280: Wear protective gloves and eye protection

**GHS Response Phrases:**

- P304 + P340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
- P310: Immediately call a POISON CENTRE or doctor/physician
- 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
- P363: Wash contaminated clothing before reuse
- P305 + P351 + P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing

**GHS Storage and Disposal Phrases:**

- Keep cool
- P405: Store locked up
- P501: Dispose of contents/cylinder by returning to supplier

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RURAL INLINE SOIL FUMIGANT

Date Prepared: 8th December 2015
Replaces: 22nd December 2011
Classified as HAZARDOUS according to the criteria of NOHSC
Classified as DANGEROUS GOODS for Land and Marine Transport (See Section 14)

3. COMPOSITION/INGREDIENTS

<table>
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<tr>
<th>Identity (Other Names)</th>
<th>CAS Number</th>
<th>Proportion</th>
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<tbody>
<tr>
<td>1,3-Dichloropropene</td>
<td>000542-75-6</td>
<td>60.8%</td>
</tr>
<tr>
<td>Chloropicrin</td>
<td>000076-06-2</td>
<td>33.3%</td>
</tr>
<tr>
<td>Balance</td>
<td>Not available</td>
<td>5.9%</td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES

Consult the Poisons Information Centre (13 11 26) or a doctor in every case of suspected chemical poisoning. Never give fluids or induce vomiting if a patient is unconscious or convulsing regardless of cause of injury. If breathing difficulties occur seek medical attention immediately.

General Advice: First Aid responders should pay attention to self-protection and use the recommended protective clothing (chemical resistant gloves, splash protection). If potential for exposure exists refer to Section 8 for specific personal protective equipment.

Swallowed: Call the Poisons Information Centre or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by the Poisons Information Centre or doctor. Never give anything by mouth to an unconscious person.

In Eye: Wash immediately and continuously with flowing water for at least 30 minutes. Remove contact lenses after the first 5 minutes and continue washing. Obtain prompt medical attention, preferably from an ophthalmologist. Suitable emergency eye wash facility/water supply should be immediately available.

On Skin: Immediate continued and thorough washing in flowing water for at least 30 minutes is imperative while removing contaminated clothing. Prompt medical attention is essential. Wash clothing before reuse. Destroy contaminated leather items. Emergency wash water should be immediately available.

Inhaled: Move person to fresh air. If person is not breathing, call 000 or an ambulance, and then give artificial respiration; if by mouth to mouth use rescuer protection (pocket mask, etc.) If breathing is difficult, oxygen should be administered by qualified personnel.

Advice to Doctor: Most important symptoms and effects, both acute and delayed
Aside from the information found under Descriptions of first aid measures (above) and Indication of immediate medical attention and special treatment needed (below), no additional symptoms and effects are anticipated.

Indication of immediate medical attention and special treatment needed
Maintain adequate ventilation and oxygenation of the patient. May cause respiratory sensitisation or asthma like symptoms. Bronchodilators, expectorants and antitussives may be of help. Treat bronchospasm with inhaled beta2 agonist and oral or parenteral corticosteroids. Respiratory symptoms, including pulmonary edema, may be delayed. Persons receiving significant exposure should be observed 24-48 hours for signs of respiratory distress. Chemical eye burns may require extended irrigation. Obtain prompt consultation, preferably from an ophthalmologist. Because rapid absorption may occur through the lungs if aspirated and cause systemic effects, the decision whether to induce vomiting or not should be made by a physician. Due to irritant properties, swallowing may result in burns/ulceration of mouth.
stomach and lower gastrointestinal tract with subsequent stricture. Aspiration of vomitus may cause lung injury. Suggest endotracheal/oesophageal control if lavage is done. Probable mucosal damage may contraindicate the use of gastric lavage. If burn is present, treat as any thermal burn, after decontamination. No specific antidote. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient. Have the Safety Data Sheet, and if available, the product container or label with you when calling a poison control centre or doctor, or going for treatment.

Excessive exposure may aggravate pre-existing asthma and other respiratory disorders (e.g. emphysema, bronchitis, reactive airways dysfunction syndrome).

**Pre-existing Conditions:**
Persons using Rural InLine should have a medical examination (especially respiratory system and skin) prior to use to detect pre-existing conditions that might place them at increased risk and to establish a baseline for future health monitoring. Persons with impaired respiratory functions may be at increased risk from exposure to Chloropicrin.

### 5. FIRE FIGHTING MEASURES

**Extinguishing Media:**
Water fog or fine spray, carbon dioxide, dry chemical, or foam. Water fog, applied gently, may be used as a blanket for extinguishing fire. General purpose synthetic foams (including AFF type) or protein foams are preferred if available. Alcohol resistant foams (ATC type) may function.

**Unsuitable Extinguishing Media:**
Do not use direct water stream. Straight or direct water streams may not be effective in extinguishing fire.

**Hazardous Combustion Products:**
During a fire, smoke may contain the original material in addition to combustion products of varying composition which may be toxic and/or irritating. Hazardous combustion products may include but not limited to nitrogen oxides, hydrogen chloride, hydrocarbons, carbon monoxide, and carbon dioxide.

**Fire and Explosion Hazards:**
Container may rupture from gas generation in a fire situation. Electrically ground and bond all equipment. Flammable mixtures of this product are readily ignited even by static discharge. Vapours are heavier than air and may travel a long distance and accumulate in low lying areas. Ignition or flashback may occur. Flammable mixtures may exist within the vapour space of containers at room temperature. Flammable concentrations of vapour can accumulate at temperatures above flash point; see section 9. Dense smoke is produced when product burns.

**Fire Fighting Procedures:**
Keep people away. Isolate and deny unnecessary entry. Stay upwind. Keep out of low areas where gases (fumes) can accumulate. Consider feasibility of a controlled burn to minimise environment damage. Foam fire extinguishing system is preferred because uncontrolled water can spread possible contamination. Water may not be effective in extinguishing fire. Use water spray to cool fire exposed containers and fire affected zone until fire is out of danger and reignition has passed. Fight fire from protected location or safe distance. Consider the use of unmanned hose holders or monitor nozzles. Immediately withdraw all personnel from the area in case of discoloration of the container. Do not use direct water stream. May spread fire. Eliminate ignition sources. Move container from fire area if this is possible without hazard. Burning liquids may be moved by flushing with water to protect personnel and minimise property damage. Water fog, applied gently may be used as a blanket for fire extinguishment. Contain fire water run-off if possible. Fire water run-off, if not contained, may cause environmental damage. Review the “Accidental Release Measures” and “Ecological Information” sections of this SDS.
SAFETY DATA SHEET

RURAL INLINE SOIL FUMIGANT

Date Prepared: 8th December 2015
Replaces: 22nd December 2011

Precautions for Fire Fighters:
Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire-fighting clothing (including fire-fighting helmet, coat, pants, boots, and gloves). Avoid contact with this material during fire-fighting operations. If contact is likely, change to full chemical resistant clothing with SCBA. If this will not provide sufficient fire protection; consider fighting fire from a remote location. Consider use of unmanned hose holder or monitor nozzles. For protective equipment in post-fire or non-fire clean-up situations, refer to the relevant sections.

Hazchem Code: 2WE

6. ACCIDENTAL RELEASE MEASURES

Emergency Procedures:
Only trained and properly protected personnel must be involved in clean-up operations. Extinguish all ignition sources in the vicinity of the spill or released vapour to avoid fire or explosion. No smoking in the area. Evacuate enclosed areas and keep bystanders out of low lying areas and move them upwind to open areas. Ground and bond all containers and handling equipment. Vapour explosion hazard. Keep out of sewers. For large spills, warn public of downwind explosion hazard. Use appropriate safety equipment.

Personal Protective Equipment:
For small spills outdoors or in well-ventilated areas, wear an Australian Standards approved full-face tight-fitting respirator or loose-fitting powered air purifying respirator (PAPR) equipped with organic vapour cartridges. In addition to respiratory protection wear coveralls and chemically resistant gloves, apron, and footwear.

Containment of Spill:
Small Spills: If it can be done safely, invert or reposition the leaking container of Rural InLine so that the area with the leak is up and the flow reduced. If possible, put the container into an overpak. Cover or confine the leakage with an absorbent such as vermiculite, clay, sand, or other non-combustible absorptive material. Collect the spent absorbent material is a disposal drum. If the spill is on the ground, dig up enough of the soil to eliminate the contamination and place the soil in a disposal drum.
Large Spills: Bund the area of large spills and contact A-Gas Rural on (08) 8347 3838 (24 hours)

Environmental Precautions:
Prevent from entering into soil, ditches, sewers, waterways and/or groundwater.

7. HANDLING AND STORAGE

Precautions for Safe Handling:
Keep out of reach of children. Do not swallow. Avoid breathing vapour or mist. Avoid contact with eyes, skin and clothing. Use with adequate ventilation. Wash thoroughly after handling. Keep cylinder closed. Cylinders, even those that have been emptied, can contain vapours. Do not cut, drill, grind, weld, or perform similar operations on or near empty containers. Use of non-sparking or explosion proof equipment may be necessary, depending on the type of operation. Keep away from heat, sparks, and flames. Never use air pressure for transferring product. No smoking, open flames or sources of ignition in handling and storage areas. Vapours are heavier than air and may travel a long distance and accumulate in low lying areas. Ignition and/or flashback may occur. Electrically bond and ground all containers and equipment before transfer or use of material. Do not enter confined spaces unless adequately ventilated.

Conditions for Safe Storage:
Store containers upright in cool, well-ventilated locked storage preferably outside or detached from other buildings. Minimise sources of ignition, such as static build-up, heat, spark or flame. Flammable mixtures may exist within the vapour space of containers at room temperature. Do not store near or with oxidising materials. Be sure cylinder is closed completely.

Special Precautions:
Do not use magnesium, aluminium or their alloys for handling equipment or containers.

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RURAL INLINE SOIL FUMIGANT

Date Prepared: 8th December 2015
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8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Limits:
1,3-Dichloropropene: NOHSC TWA 1 ppm (4.5 mg/m³), Skin. Carcinogen category 3, skin. Chloropicrin: NOHSC TWA 0.1 ppm (0.67 mg/m³).

A ‘skin’ notation following the exposure guideline refers to the potential for dermal absorption of the material including mucous membranes and the eyes either by contact with vapours or by direct skin contact. It is intended to alert the reader that inhalation may not be the only route of exposure and that measures to minimise dermal exposures should be considered.

Engineering Controls:
Provide general and/or local exhaust ventilation to control airborne levels below the exposure guidelines. Lethal concentrations may exist in areas with poor ventilation, including low lying areas.

RECOMMENDATIONS FOR MANUFACTURING, COMMERCIAL BLENDING, AND PACKAGING WORKERS:

Personal Protective Equipment:
Respiratory Protection: Atmospheric levels should be maintained below the exposure guideline. When respiratory protection is required, use an approved self-contained breathing apparatus or positive pressure airline with auxiliary self-contained air supply.

Protective Gloves: Potentially fatal if absorbed through the skin. Use gloves chemically resistant to this material. For help in selecting suitable equipment, consult AS 2161.

Eye Protection: Use chemical goggles. Wear a face-shield, which allows use of chemical goggles, or wear full face respirator, to protect face and eyes when there is any likelihood of splashes. Eye wash fountain/equipment should be located in immediate work area. If exposure causes eye discomfort, use a full face respirator.

Clothing: Use protective clothing chemically resistant to this material. Selection of specific items such as face shield, gloves, boots, apron, or full-body suit will depend on operation. A safety shower, or emergency washing facilities, should be located in the immediate work area. Remove contaminated clothing immediately, wash skin area with soap and water, and launder clothing before reuse or dispose of properly. Items, which cannot be decontaminated, such as shoes, belts, and watchbands should be removed and disposed of properly. If hands are cut or scratched, use chemical resistant gloves even for brief exposures.

Safety Boots: Wearing safety boots in industrial situations is advised.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Colourless to brown liquid
Odour: Pungent
pH: 5.9 CIPAC MT 75.2 1% aqueous solution
Vapour Pressure: Approx. 30 mmHg @ 20°C (moderately volatile)
Boiling Point: 200°F (93°C)
Freezing Point: -120°F (-85°C)
Solubility in Water: 0.2g/100g
Specific Gravity/Density: 1.32 @ 23°C (H₂O = 1)
Solubility in water: Emulsifiable
Flash Point: 39°C (PMCC)
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Date Prepared: 8th December 2015
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Flammable Limits in Air: Lower: 5.5% (V) (1,3-dichloropropene) Upper: 14.5% (V) (1,3-dichloropropene)
Autoignition Temperature: 308°C (586°F) 92/69/EEC A15
Kinematic Viscosity: 0.748 mm2/s @ 40°C  0.938 mm2/s @ 20°C
Explosive Properties: No EEC A14
Oxidising Properties: No

10. STABILITY AND REACTIVITY

Chemical Stability and Conditions to Avoid: Unstable at elevated temperatures. Avoid moisture, open flames, welding arcs, or other high temperature sources, which induce thermal decomposition. Generation of gas during decomposition can cause pressure in closed systems. Pressure build up can be rapid.

Incompatible Materials: Moisture – Corrosive when wet. Reaction with water can generate gases and acids. Avoid contact with amines and strong bases, oxidising materials, metals such as zinc, cadmium, and magnesium and/or absorbent materials such as organic absorbents.

Hazardous Decomposition Products: Depends on the temperature, air supply and the presence of other materials. Hazardous combustion products may include but are not limited to nitrogen oxides, hydrogen chloride, hydrocarbons, carbon monoxide, and carbon dioxide.

Polymerisation: Not known to occur.

11. TOXICOLOGICAL INFORMATION

ACUTE

Swallowed: Moderate toxicity if swallowed. The oral LD50 for rats is > 100 (males) and 100-200 (females) mg/kg. Small amounts swallowed incidental to normal handling operations are not likely to cause injury; however, swallowing larger amounts may cause serious injury, even death. Aspiration into the lungs may occur during ingestion or vomiting, resulting in rapid absorption and injury to other body systems. Swallowing may result in gastrointestinal irritation or ulceration.

In Eyes: May cause severe eye irritation with corneal injury, which may result in permanent impairment of vision, even blindness. Chemical burns may occur. Vapours may cause lacrimation (tears) and eye irritation may be experienced as mild discomfort and redness.

On Skin: Brief contact may cause severe skin burns. Symptoms may include pain, severe local redness, and tissue damage. Prolonged or widespread skin contact may result in absorption of harmful amounts. The LD50 for skin absorption in rabbits is between 907 (males) and > 1000 (females) mg/kg. Classified as corrosive to the skin. Vapour may cause skin irritation. May cause more severe response if skin is abraded (scratched or cut). Skin contact may cause an allergic reaction in a small proportion of individuals.

Inhaled: Brief exposure (minutes) to easily attainable concentrations may cause serious adverse effects, even death. Excessive exposure may cause severe irritation to upper respiratory tract (nose and throat) and lungs. Excessive exposure to Chloropicrin may cause lung injury. May cause allergic respiratory response. Excessive exposure may cause Methemoglobinemia, thereby impairing the blood’s ability to transport oxygen. May cause central nervous system effects and nausea or vomiting. Chloropicrin has also caused weak/irregular heart action and muscle damage upon severe exposure.

Respiratory Sensitisation: Chloropicrin. May cause allergic respiratory response.
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Aspiration Hazard: Aspiration into the lungs may occur during ingestion or vomiting, resulting in rapid absorption and injury to other body systems.

Effects of Repeated Exposure:
- **1,3-Dichloropropene**: Repeated contact may cause skin irritation with local redness. In animals, effects have been reported on the following organs: Liver, Kidney, Respiratory Tract, Bladder, Lung, and Nasal Tissue.
- **Chloropicrin**: In animals, effects have been reported on the following organs: Gastrointestinal Tract, and Respiratory Tract.

CHRONIC Reproductive Effects:
For the major components, Chloropicrin and 1,3-Dichloropropene, did not interfere with reproduction in animal studies.

Teratogenic Effects: Birth defects are unlikely. Even exposures having an adverse effect on the mother should have no effect on the foetus.

Mutagenic Effects: For the component 1.3-Dichloropropene, in-vitro toxicity studies were negative in some cases and positive in other cases. Animal genetic toxicity studies were negative. For Chloropicrin, in-vitro genetic toxicity studies were negative in some cases and positive in other cases. Animal genetic toxicity studies were inconclusive.

Carcinogenic Effects: 1,3-D has been shown to cause cancer in laboratory animals by the oral route when the dose exceeds the body’s defence mechanisms. Inhalation exposure resulted in an increase in the normal occurrence of benign lung tumours in male mice. Not classified as a carcinogen by the Australian Advisory Committee on Chemicals Scheduling under normal conditions of exposure. 1,3-Dichloropropene is listed as a potential carcinogen for hazard communication purposes under the National Exposure Standards for Atmospheric Contaminants in the Occupational Environment [NOHSC:1003 (1995)].

12. ECOLOGICAL INFORMATION

Movement and Partitioning:
- **1,3-Dichloropropene**
  - Mobility in soil: Potential for mobility in soil is very high (Koc between 0 and 50).
  - Bioaccumulation: Bioconcentration potential is low (BCF < 100 or Log Pow < 3).
  - Partition coefficient, n-octanol/water (Koc): 2.06 Measured
- **Chloropicrin**
  - Mobility in soil: Potential for mobility in soil is very high (Koc between 0 and 50)
  - Henry’s Law Constant (H): 2.05E-03 atm*m^3/mole; 25°C Measured.
  - Distribution in Environment: Mackay Level 1 Fugacity Model:
    | Air       | Water   | Biota | Soil  | Sediment |
    |-----------|---------|-------|-------|----------|
    | 96.94%    | 2.76%   | <0.01%| 0.28% | <0.01%   |

Ecotoxicity: Material is highly toxic to aquatic organisms on an acute basis (LC50 or EC50 is < 1 mg/L in most sensitive species tested).

- **Fish Acute and Prolonged Toxicity**
  - LC50, rainbow trout (oncorhynchus mykiss), 96 h: 2.78 – 4.63 mg/L
  - LC50, sheepshead minnow (cyprinodon variegatus), 96 h: 0.91 mg/L
- **Aquatic Invertebrate Acute Toxicity**
  - EC50 eastern oyster (crassostrea virginica), 96 h shell growth inhibition: 0.67 mg/L
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Aquatic Plant Toxicity
EbC\textsubscript{50}, diatom navicular sp., biomass growth inhibition, 120 h: 0.29 mg/L
EbC\textsubscript{50}, duckweed lemma sp., biomass growth inhibition, 14 h: 3.60 mg/L

Fish Chronic Toxicity Value (ChV)
fish, flow-through, 33 d, survival, LC\textsubscript{50}, NOEC: 0.117 mg/L, LOEC: 0.204 mg/L

Aquatic Invertebrates Chronic Toxicity Value
water flea daphnia magna, 21 d, number of offspring, EC\textsubscript{50}, NOEC: 0.073 mg/L, LOEC: 0.109 mg/L

Toxicity to Above Ground Organisms
oral LD\textsubscript{50}, bobwhite (colinus virginianus): 152 mg/kg bodyweight
dietary LC\textsubscript{50}, bobwhite (colinus virginianus): > 5620 mg/kg diet
LC\textsubscript{50}, honey bee (apis mellifera): 18097 mg/m\textsuperscript{3}

Persistence / Degradability:
- Degradation is expected in the atmospheric environment within minutes to weeks
- Degradation is expected in the soil environment within days to weeks
- 1.3-Dichloropropene has a stratospheric ozone depletion potential (ODP) of 0.02, relative to CFC 12 (ODP=1)

Based largely or completely on information for chloropicrin. Chloropicrin degrades to carbon dioxide in soil with a half-life between 8 hours and 4.5 days. In water, Chloropicrin degrades to carbon dioxide, bicarbonate, chloride, nitrate and nitrite within 32 hours when exposed to light. Half-life in air when exposed to simulated sunlight was 20 days with the end products being phosgene, nitric oxide, chlorine, nitrogen dioxide and dinitrogen tetroxide.

13. DISPOSAL CONSIDERATIONS

Disposal Methods: Empty containers should be triple rinsed and taken to your nearest drumMUSTER collection point. Do not use empty containers to store any other material.
If wastes and/or containers cannot be disposed of according to the product label directions, disposal of this material must be in accordance with your local or area regulatory authorities.

14. TRANSPORT INFORMATION

UN Number: 3390
Proper Shipping Name: TOXIC BY INHALATION, LIQUID, CORROSIVE, N.O.S. (CHLOROPICRIN AND 1,3-DICHLOROPROPENE)
DG Class (Subsidiary Risk): 6.1 (3) (8)
Packaging Group: I
Marine Pollutant: Yes
Hazchem Code: 2WE

15. REGULATORY INFORMATION

Poison Scheduling: S7
Registration/Notification: APVMA Product No. 63054

16. OTHER INFORMATION

Glossary
ACGIH: American Conference of Governmental Industrial Hygienists
BCF: Bioconcentration Factor – a measure for the characterisation of the accumulation of a chemical in an organism. It is defined as the concentration of a chemical in an organism (plants, microorganisms, animals) divided by the concentration in a reference compartment (e.g. food, surrounding water)
BOD: Biochemical oxygen demand – the amount of oxygen required by aerobic microorganisms to decompose the organic matter in a sample of water, such as that polluted by sewage. It is used as a measure of the degree of water pollution.
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pollution. Also called biological oxygen demand.

EC50: median effective concentration. Statistically derived concentration of a substance in an environmental medium expected to produce a certain effect in 50% of test organisms in a given population under a defined set of conditions

EEL: Environmental exposure standard set by ERMA

Explosive Limits: The range of concentrations (% by volume in air) of a flammable gas or vapour that can result in an explosion or ignition in a confined space

Koc: the organic carbon partition coefficient (mL soil water / g organic carbon)

Kow: See Pow

LC50: Lethal concentration 50%. A concentration of chemical in air or water that will kill 50% of the test organisms

LD50: Lethal dose 50%. The doses of chemical that will kill 50% of the test animals receiving it.

NOSHC: National Occupational Health and Safety Commission of Australia, now SafeWork Australia

PEL: Permissible exposure level, a maximum allowable exposure level by law

Polymerisation: a chemical reaction in which small molecules (monomers) combine to form much larger molecules (polymers). A hazardous polymerisation reaction is one that occurs at a fast rate and releases large amounts of energy

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