



## Section 1 - Identification of The Material and Supplier

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**Chemical nature:** Linuron is a urea derivative.  
**Trade Name:** **Linurex Flowable Herbicide**  
**Product Use:** Agricultural herbicide for use as described on the product label.  
**Creation Date:** **February, 2008**  
**This version issued:** **August, 2012** and is valid for 5 years from this date.

## Section 2 - Hazards Identification

### Statement of Hazardous Nature

This product is classified as: T, Toxic. N, Dangerous to the environment. Hazardous according to the criteria of SWA.

Not subject to the ADG Code when transported in Australia by Road or Rail in packages 500kg(L) or less; or IBCs (refer to SP AU01). However if transported by Air or Sea, this provision does not apply. Then the product is classed as Dangerous (Class 9 Environmentally Hazardous) by IATA and IMDG respectively. See details below and in Section 14 of this MSDS.

**Risk Phrases:** R22, R40, R61, R62, R48/22, R50/53. Harmful if swallowed. Limited evidence of a carcinogenic effect. May cause harm to the unborn child. Possible risk of impaired fertility. Harmful: danger of serious damage to health by prolonged exposure if swallowed. Very toxic to aquatic organisms, may cause long-term adverse effects to the aquatic environment.

**Safety Phrases:** S2, S3, S13, S20, S35, S46, S57, S60, S61, S36/37. Keep out of reach of children. Keep in a cool place. Keep away from food, drink and animal feeding stuffs. When using, do not eat or drink. This material and its container must be disposed of in a safe way. If swallowed, contact a doctor or Poisons Information Centre immediately and show this MSDS or label. Use appropriate container to avoid environmental contamination. This material and its container must be disposed of as hazardous waste. Avoid release to the environment. Refer to special instructions/Safety Data Sheets. Wear suitable protective clothing and gloves.

**SUSMP Classification:** None allocated.

**IMDG Classification:** Class 9: Miscellaneous dangerous goods.

**UN Number:** 3082, ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.

### Emergency Overview

**Physical Description & colour:** Brownish coloured liquid.

**Odour:** Aromatic odour.

**Major Health Hazards:** Linuron is harmful by ingestion, with reported oral LD<sub>50</sub> values of 1200 to 1500 mg/kg in rats, and 2250 mg/kg in rabbits. The reported dermal LD<sub>50</sub> in rabbits is greater than 5000 mg/kg. It has been reported to be a skin sensitizer in guinea pigs, and an eye irritant in rabbits, but not a skin irritant in rabbits. The 4-hour inhalation LC<sub>50</sub> is 6.15 mg/L, which indicates slight toxicity by this route.

### Potential Health Effects

See section 11 for Chronic exposure studies.

#### Inhalation:

**Short term exposure:** Available data indicates that this product is not harmful. However product may be mildly irritating, although unlikely to cause anything more than mild transient discomfort.

#### Skin Contact:

**Short term exposure:** Available data indicates that this product is not harmful. It should present no hazards in normal use. However product may be mildly irritating, but is unlikely to cause anything more than mild discomfort which should disappear once contact ceases.

#### Eye Contact:

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**Short term exposure:** This product may be mildly irritating to eyes, but is unlikely to cause anything more than mild discomfort which should disappear once product is removed.

**Ingestion:**

**Short term exposure:** Significant oral exposure is considered to be unlikely. Available data shows that this product is harmful, but symptoms are not available. However, this product may be irritating to mucous membranes but is unlikely to cause anything more than transient discomfort.

**Carcinogen Status:**

**SWA:** Linuron is classified by SWA as a Class 3 Carcinogen, possibly carcinogenic to humans.

See the SWA website for further details. A web address has not been provided as addresses frequently change.

**NTP:** No significant ingredient is classified as carcinogenic by NTP.

**IARC:** No significant ingredient is classified as carcinogenic by IARC.

### Section 3 - Composition/Information on Ingredients

Ingredients	CAS No	Conc,%	TWA (mg/m <sup>3</sup> )	STEL (mg/m <sup>3</sup> )
Linuron	330-55-2	36-40	not set	not set
Other non hazardous ingredients	secret	to 100	not set	not set

This is a commercial product whose exact ratio of components may vary slightly. Minor quantities of other non hazardous ingredients are also possible.

The SWA TWA exposure value is the average airborne concentration of a particular substance when calculated over a normal 8 hour working day for a 5 day working week. The STEL (Short Term Exposure Limit) is an exposure value that may be equalled (but should not be exceeded) for no longer than 15 minutes and should not be repeated more than 4 times per day. There should be at least 60 minutes between successive exposures at the STEL. The term "peak" is used when the TWA limit, because of the rapid action of the substance, should never be exceeded, even briefly.

### Section 4 - First Aid Measures

**General Information:**

You should call The Poisons Information Centre if you feel that you may have been poisoned, burned or irritated by this product. The number is 13 1126 from anywhere in Australia (0800 764 766 in New Zealand) and is available at all times. Have this MSDS with you when you call.

**Inhalation:** First aid is not generally required. If in doubt, contact a Poisons Information Centre or a doctor.

**Skin Contact:** Irritation is unlikely. However, if irritation does occur, flush with lukewarm, gently flowing water for 5 minutes or until chemical is removed.

**Eye Contact:** No effects expected. If irritation does occur, flush contaminated eye(s) with lukewarm, gently flowing water for 5 minutes or until the product is removed. Obtain medical advice if irritation becomes painful or lasts more than a few minutes. Take special care if exposed person is wearing contact lenses.

**Ingestion:** If swallowed, do NOT induce vomiting. Wash mouth with water and contact a Poisons Information Centre, or call a doctor.

### Section 5 - Fire Fighting Measures

**Fire and Explosion Hazards:** There is no risk of an explosion from this product under normal circumstances if it is involved in a fire.

Only small quantities of decomposition products are expected from this products at temperatures normally achieved in a fire. This will only occur after heating to dryness.

Fire decomposition products from this product may be toxic if inhaled. Take appropriate protective measures.

**Extinguishing Media:** Try to contain spills, minimise spillage entering drains or water courses.

**Fire Fighting:** If a significant quantity of this product is involved in a fire, call the fire brigade. There is little danger of a violent reaction or explosion if significant quantities of this product are involved in a fire. Recommended personal protective equipment is full fire kit and and breathing apparatus.

**Flash point:** Does not burn.

**Upper Flammability Limit:** Does not burn.

**Lower Flammability Limit:** Does not burn.

**Autoignition temperature:** Not applicable - does not burn.

**Flammability Class:** Does not burn.

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## Section 6 - Accidental Release Measures

**Accidental release:** In the event of a major spill, prevent spillage from entering drains or water courses. As a minimum, wear overalls, goggles and gloves. Suitable materials for protective clothing include rubber, PVC. Eye/face protective equipment should comprise as a minimum, protective glasses and, preferably, goggles.

Stop leak if safe to do so, and contain spill. Absorb onto sand, vermiculite or other suitable absorbent material. If spill is too large or if absorbent material is not available, try to create a dike to stop material spreading or going into drains or waterways. Because of the environmentally hazardous nature of this product, special care should be taken to restrict release to waterways or drains. Sweep up and shovel or collect recoverable product into labelled containers for recycling or salvage, and dispose of promptly. Recycle containers wherever possible after careful cleaning. Refer to product label for specific instructions. After spills, wash area preventing runoff from entering drains. If a significant quantity of material enters drains, advise emergency services. Full details regarding disposal of used containers, spillage and unused material may be found on the label. If there is any conflict between this MSDS and the label, instructions on the label prevail. Ensure legality of disposal by consulting regulations prior to disposal. Thoroughly launder protective clothing before storage or re-use. Advise laundry of nature of contamination when sending contaminated clothing to laundry.

## Section 7 - Handling and Storage

**Handling:** Keep exposure to this product to a minimum, and minimise the quantities kept in work areas. Check Section 8 of this MSDS for details of personal protective measures, and make sure that those measures are followed. The measures detailed below under "Storage" should be followed during handling in order to minimise risks to persons using the product in the workplace. Also, avoid contact or contamination of product with incompatible materials listed in Section 10.

**Storage:** Although this is classed as a Dangerous Good, you may not need a license to store it. If you have any doubts, we suggest you contact your Dangerous Goods authority in order to clarify your obligations. Check packaging - there may be further storage instructions on the label.

## Section 8 - Exposure Controls and Personal Protection

The following Australian Standards will provide general advice regarding safety clothing and equipment:

Respiratory equipment: **AS/NZS 1715**, Protective Gloves: **AS 2161**, Occupational Protective Clothing: **AS/NZS 4501 set 2008**, Industrial Eye Protection: **AS1336** and **AS/NZS 1337**, Occupational Protective Footwear: **AS/NZS2210**.

<b>SWA Exposure Limits</b>	<b>TWA (mg/m<sup>3</sup>)</b>	<b>STEL (mg/m<sup>3</sup>)</b>
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Exposure limits have not been established by SWA for any of the significant ingredients in this product.

The ADI for Linuron is set at 0.01mg/kg/day. The corresponding NOEL is set at 1.25mg/kg/day. ADI means Acceptable Daily Intake and NOEL means No-observable-effect-level. Values taken from Australian ADI List, Sept 2011.

No special equipment is usually needed when occasionally handling small quantities. The following instructions are for bulk handling or where regular exposure in an occupational setting occurs without proper containment systems.

**Ventilation:** No special ventilation requirements are normally necessary for this product. However make sure that the work environment remains clean and that vapours and mists are minimised.

**Eye Protection:** Eye protection is not normally necessary when this product is being used. However, if in doubt, wear suitable protective glasses or goggles.

**Skin Protection:** The information at hand indicates that this product is not harmful and that normally no special skin protection is necessary. However, we suggest that you routinely avoid contact with all chemical products and that you wear suitable gloves (preferably elbow-length) when skin contact is likely.

**Protective Material Types:** We suggest that protective clothing be made from the following: rubber, PVC.

**Respirator:** Usually, no respirator is necessary when using this product. However, if you have any doubts consult the Australian Standard mentioned above.

Safety deluge showers should, if practical, be provided near to where this product is being used.

## Section 9 - Physical and Chemical Properties:

<b>Physical Description &amp; colour:</b>	Brownish coloured liquid.
<b>Odour:</b>	Aromatic odour.
<b>Boiling Point:</b>	Approximately 100°C at 100kPa.
<b>Freezing/Melting Point:</b>	Approximately 0°C.
<b>Volatiles:</b>	Water component.
<b>Vapour Pressure:</b>	2.37 kPa at 20°C (water vapour pressure).
<b>Vapour Density:</b>	No data.

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<b>Specific Gravity:</b>	1.17-1.21 at 20°C
<b>Water Solubility:</b>	Emulsifiable.
<b>pH:</b>	7.0 to 9.5
<b>Volatility:</b>	No data.
<b>Odour Threshold:</b>	No data.
<b>Evaporation Rate:</b>	No data.
<b>Coeff Oil/water distribution:</b>	Linuron 3.07 (log P octanol/water)
<b>Autoignition temp:</b>	Not applicable - does not burn.

## Section 10 - Stability and Reactivity

**Reactivity:** This product is unlikely to react or decompose under normal storage conditions. However, if you have any doubts, contact the supplier for advice on shelf life properties.

**Conditions to Avoid:** Store in the closed original container in a dry, cool, well-ventilated area out of direct sunlight.

**Incompatibilities:** strong acids, strong bases, strong oxidising agents.

**Fire Decomposition:** Only small quantities of decomposition products are expected from this products at temperatures normally achieved in a fire. This will only occur after heating to dryness. Carbon dioxide, and if combustion is incomplete, carbon monoxide and smoke. Nitrogen and its compounds, and under some circumstances, oxides of nitrogen. Occasionally hydrogen cyanide gas in reducing atmospheres. Hydrogen chloride gas, other compounds of chlorine. Water. Carbon monoxide poisoning produces headache, weakness, nausea, dizziness, confusion, dimness of vision, disturbance of judgment, and unconsciousness followed by coma and death.

**Polymerisation:** This product will not undergo polymerisation reactions.

## Section 11 - Toxicological Information

**Toxicity: Acute toxicity:** Linuron is of slight toxicity by ingestion, with reported oral LD<sub>50</sub> values of 1200 to 1500 mg/kg in rats, and 2250 mg/kg in rabbits. The reported dermal LD<sub>50</sub> in rabbits is greater than 5000 mg/kg. It has been reported to be a skin sensitizer in guinea pigs, and an eye irritant in rabbits, but not a skin irritant in rabbits. The 4-hour inhalation LC<sub>50</sub> is 6.15 mg/L, which indicates slight toxicity by this route.

**Chronic toxicity:** Skin sensitization was seen in guinea pigs repeatedly exposed. Alterations in red blood cells were seen in rats given 2.75 mg/kg/day over 2 years. Anaemia was seen in dogs at doses above 6.25 mg/kg/day.

**Reproductive effects:** In a three-generation study, no reproductive effects were observed at doses of 12.5 mg/kg/day. These data suggest that reproductive effects are unlikely in humans at expected exposure levels.

**Teratogenic effects:** Pregnant rabbits fed high doses of Linuron during the sensitive period of pregnancy had normal offspring at doses of up to 25 mg/kg/day, even though maternal weight gain was reduced. In rats, doses of 6.25 mg/kg/day did not produce teratogenic effects. These data suggest that Linuron is not likely to cause birth defects.

**Mutagenic effects:** Linuron caused mutations in one microbial assay. But in several other mutagenicity and genotoxicity assays, including the Ames assay, E. coli culture assay, Chinese hamster ovary cell culture assay, and whole animal studies, Linuron showed no mutagenic or genotoxic activity. Thus, it appears that Linuron is either nonmutagenic or slightly mutagenic.

**Carcinogenic effects:** Several animal studies of mice, rats, and dogs have shown that it produces non-malignant liver and testicular tumours. In these studies, doses of 72.5 mg/kg/day in rats caused testicular adenomas and 180 mg/kg/day in mice caused hepatocellular adenoma. These data are not sufficient to determine Linuron's carcinogenicity to humans.

**Organ toxicity:** Rats and dogs fed Linuron for 2 years had detectable residues of Linuron in their blood, fat, kidney, and spleen, but these did not seem to be associated with adverse effects.

**Fate in humans and animals:** In rats, Linuron breaks down completely after passing through the liver. It is thus unlikely to bioaccumulate in mammalian systems.

## Section 12 - Ecological Information

Very toxic to aquatic organisms, may cause long-term adverse effects to the aquatic environment. This product is biodegradable. It will not accumulate in the soil or water or cause long term problems.

**Effects on birds:** Linuron is slightly toxic to birds; the reported 5- to 8-day dietary LC<sub>50</sub> values are greater than 5000 ppm in Japanese quail, 3000 ppm in mallard ducks, and 3500 ppm in pheasants.

**Effects on aquatic organisms:** Linuron is slightly toxic to fish and aquatic invertebrate species. The reported LC<sub>50</sub> for Linuron in trout and bluegill is 16 mg/L. The median threshold levels, i.e. levels at which adverse, sub lethal effects were apparent in 50% of the test animals, are greater than 40 mg/L in crawfish and tadpoles exposed over a 48-hour period.

**Effects on other organisms:** Linuron is nontoxic to bees.

**Environmental Fate:**

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**Breakdown in soil and groundwater:** Linuron is moderately persistent in soils, with a field half-life of 30 to 150 days in various soils and under various conditions. A representative field half-life is estimated to be approximately 60 days. Microbial degradation is the major process by which Linuron is lost from soils; photodegradation and volatilization are not important contributors to its breakdown. The metabolites of Linuron (3,4-dichloroaniline and carbon dioxide) are less toxic than Linuron. Linuron is moderately bound to soil, and is soluble in water. Losses may occur through transport of Linuron in runoff water and on suspended colloidal matter. Linuron has been found at very low concentrations in well and groundwater samples in some US states.

**Breakdown in water:** Linuron is slightly to moderately soluble in water, and is not readily broken down in water.

**Breakdown in vegetation:** Linuron is more readily absorbed by roots from soil application, than by leaves from foliar application. The rate at which it is absorbed, translocated, and subsequently broken down (or metabolized) differs with various plant species.

### Section 13 - Disposal Considerations

**Disposal:** Instructions concerning the disposal of this product and its containers are given on the registered label. These should be carefully followed. Special help is available for the disposal of Agricultural Chemicals. The product label will give general advice regarding disposal of small quantities, and how to cleanse containers. However, for help with the collection of unwanted rural chemicals, contact ChemClear 1800 008 182 <http://www.chemclear.com.au/> and for help with the disposal of empty drums, contact DrumMuster <http://www.drummuster.com.au/> where you will find contact details for your area.

### Section 14 - Transport Information

**Not subject to the ADG Code when transported by Road or Rail in Australia, in packages 500kg(L) or less; or IBCs, but classed as Dangerous by IATA and IMDG when carried by Air or Sea transport (see details below).**

**ADG Code:** 3082, ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.

**Hazchem Code:** •3Z

**Special Provisions:** 179, 274, AU01

**Limited quantities:** ADG 7 specifies a Limited Quantity value of 5 L for this class of product.

**Dangerous Goods Class:** Class 9: Miscellaneous Dangerous Goods.

**Packaging Group:** III

**Packaging Method:** P001, IBC03, LP01

Class 9 Miscellaneous Dangerous Goods shall not be loaded in the same vehicle or packed in the same freight container with Dangerous Goods of Class 1 (Explosives).

### Section 15 - Regulatory Information

**AICS:** All of the significant ingredients in this formulation are compliant with NICNAS regulations.

### Section 16 - Other Information

**This MSDS contains only safety-related information. For other data see product literature.**

#### Acronyms:

<b>ADG Code</b>	Australian Code for the Transport of Dangerous Goods by Road and Rail, 7th Edition
<b>AICS</b>	Australian Inventory of Chemical Substances
<b>SWA</b>	Safe Work Australia, formerly ASCC and NOHSC
<b>CAS number</b>	Chemical Abstracts Service Registry Number
<b>Hazchem Code</b>	Emergency action code of numbers and letters that provide information to emergency services especially firefighters
<b>IARC</b>	International Agency for Research on Cancer
<b>NOS</b>	Not otherwise specified
<b>NTP</b>	National Toxicology Program (USA)
<b>R-Phrase</b>	Risk Phrase
<b>SUSMP</b>	Standard for the Uniform Scheduling of Medicines & Poisons
<b>UN Number</b>	United Nations Number

#### Contact Points:

Call Adama on (02)9431 7800 and ask for the technical manager.

Fax: (02)9431 7700

**Police and Fire Brigade:**

**Dial 000**

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<b>Emergency contact:</b>	<b>1800 024 973 (24 hours)</b>
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**If ineffective: Dial Poisons Information Centre  
(13 1126 from anywhere in Australia)**

The information contained in this Material Safety Data Sheet is provided in good faith and is believed to be correct at the date hereof. However, it is expected that individuals receiving the information will exercise their independent judgement in determining its appropriateness for a particular purpose. Adama Australia Pty Ltd makes no representation as to the accuracy or comprehensiveness of the information and to the full extent allowed by law excludes all liability whatsoever, whether with respect to negligence or otherwise, for any loss or damage arising from or connection with the supply or use of the information in this Material Safety Data Sheet.

Please read all labels carefully before using product.

This MSDS is prepared in accord with the SWA document "National Code of Practice for the Preparation of Material Safety Data Sheets" 2nd Edition [NOHSC:2011(2003)]

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