

**GOLD STANDARD
PREMIUM PRODUCT
(February 2009)**

GEOTECH

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INTRODUCTION

Geotechnical Services Pty Ltd is a NATA and ISO accredited, specialised analytical laboratory and consulting service established in 1990. Our Condition Monitoring division analyses lubricating oils, performs fuel quality testing to detect operational problems and to help plan machinery maintenance on equipment used in mining, fishing, agricultural and transport industries.

Geotech's Condition Monitoring Division is known for its expertise and state of the art equipment as well as its experience in all aspects of oil analysis and consulting. It is through our laboratory activities that we detect common problems occurring in machinery operation. For many years, we have produced a range of chemical treatments to solve problems relating to contaminated fuel storage systems.

The objective of **Geotechnical Services Pty Ltd** in the manufacture of the **Gold Standard Premium Product** range is to produce products of superior technical standards, capable of meeting the specific requirements of our customers. The current range of products that we manufacture and distribute is **Cladocide Gold and Bio-Kill**. Each of these products is designed for specific applications and is manufactured to a very high technical standard. The effectiveness of the product in solving your problem is our guarantee that you will receive excellent value for money.

The information supplied in this booklet is designed to help make you more familiar with the **Gold Standard Premium Product** range. If you have any additional queries, please call to discuss your requirements with our sales representative or experienced technical advisors.

MICROBIOLOGICAL GROWTHS IN DIESEL FUEL

AN INTRODUCTION TO CLADOCIDE GOLD

Cladocide Gold is a liquid chemical treatment designed to prevent or eradicate fungal and bacterial growths in diesel and other fuel storage systems. **Cladocide Gold** contains an antioxidant and an additive to clean, protect and lubricate fuel system components.

Cladocide Gold is easy to use and is compatible with a wide variety of fuel systems and associated components. It is soluble in both fuel and water and partitions between the fuel and water layers occurring in most storage tanks, thus preventing any fungal and bacterial infestations.

FUNGAL AND BACTERIAL GROWTH

Several forms of fungi can survive and multiply in hydrocarbon products and fuels, occurring in all components of fuel handling systems, storage tanks, fuel delivery trucks, delivery lines and fuel tanks of machines. These fungi grow into long strings and form large mats or globules. The growth appears slimy and usually is black, green or brown, though the colour may vary. It usually commences at the interface between the fuel and the water and in only a short period of time will spread throughout the fuel itself. The growth may spread throughout the storage tank system and can enter the fuel systems of plant and machinery when fuel is dispensed. Pumping the fuel through the machine fuel system completes the spread.

The most common form of fungal growth is *Cladosporium resinae*. *Cladosporium* grows rapidly under varying conditions, needing only trace amounts of water and minerals to sustain it. As it grows, it chemically alters the fuel to produce water, sludge and other by-products, thus enhancing its own environment. *Cladosporium* and its by-products can attack fuel tanks, fuel lines, hoses and other expensive components of the fuel system.

Once contaminated, related problems such as fuel tank gauge damage and premature injector or injector pump failures are commonplace. Premature filter blockage also occurs due to both fungal residue and fuel "dropout". This damage is not only caused by blockage but also by the loss of the lubricating and cooling efficiency of the fuel itself, resulting in partial or total seizure of the components. The by-product of the growth due to the reduction in chemical stability or oxidation causes this.

DETECTION AND CONFIRMATION

The growth can be visually detected in the form of mats or slimy masses within the tank, fuel system or in the fuel filters. The fuel may develop a sulfurous odour, similar to that of rotten eggs. The exhaust of machinery using contaminated fuel in some cases will be darker due to the reduced combustion efficiency of the fuel. Where there is no clear evidence but contamination is suspected, fuel samples should be taken and forwarded to Geotech's laboratory for testing.

Microbiological growths such as *Aspergillus flavus*, *Pseudomonas aeruginosa*, oxidising yeast species and sulphate reducing bacteria are the causes of other microbial infections in diesel fuels. These growths do not usually occur until a fungal growth is present, but occasionally have been reported in isolation.

Although premature darkening and oxidation of fuel is one of the symptoms of fungal contamination, it should be remembered that this may also be due to poor refinery production control or mixing of fuels produced by different refining techniques, both of which can, in some instances, result in oxidation stability loss.

Long term storage can also result in oxidation stability loss, the most common indications of which are darkening and development of odours. **Cladocide Gold** contains a powerful antioxidant to increase resistance to oxidative attack and prolong storage stability.

PREVENTION RATHER THAN CURE

The problem of fungal attack on diesel fuel can be alleviated by a two step procedure:

- i) **regular** use of a biocide such as **Cladocide Gold**.
- ii) proper maintenance of the fuel handling system. This is the key step, because the effectiveness of even the most efficient fungicide (or other biocide) can be reduced if the fuel is allowed to retain fungal debris and high levels of water. Proper maintenance requires regular removal of accumulated bottom sediments, drainage of sump areas and filtering to remove suspended debris.

Filters and screens should be inspected regularly. Storage tanks should be included in regular cleaning and inspection schedules. In some instances, good housekeeping may be all that is needed to prevent fungal growth. However, contamination occurs very easily and even the best maintained system can benefit from the preventative use of **Cladocide Gold**.

INSTRUCTION FOR THE USE OF CLADOCIDE GOLD

Before commencing any treatment it is important to remove all water present in the system if possible.

Infected Systems

- 1) If there is an existing infestation, the system or storage facility should be treated at the rate of 1L per 1000L of fuel for at least 12 hours. This should be followed up by cleaning and external filtering (where required) of the fuel to remove debris and fungal material as water, chemical and physical debris are released as the fungal mats break down.
- 2) When treated, the fungal growth loses its slimy nature and is more easily filtered out. Filtration is better than dispersing the debris into small particles, because of the very abrasive nature of the water and fungal debris, which will affect especially the injector pump. A filtering system capable of removing particles of less than five microns is ideal for this process, due to its ability to remove most of the particles created by the fuel “dropout” whilst also removing other debris.
- 3) The fuel system or storage facility should be checked for damage resulting from the contamination and appropriate repairs should be performed. The breathing system needs to be suited to the operating environment and free from defects or blockage.
- 4) Treatment should continue for a minimum of 6 months to allow all spores to mature and be eradicated.
- 5) The most effective application of **Cladocide Gold** is to administer it to partially filled tanks immediately prior to filling, or to flowing fuel to ensure complete blending. Where this is not possible, **Cladocide Gold** will blend with only slight agitation.
- 6) Tanks should be completely filled during the treatment process to ensure contact of all tank surface areas with **Cladocide Gold**.

Do not add **Cladocide Gold** to empty fuel tanks, as water is usually present at the bottom. If there is a sufficient volume of water, all of the Cladocide will dissolve in the water and this could reduce or negate the effectiveness of the product.

The product will, however, successfully treat small volumes of water bottoms if diesel fuel is present.

Maintenance Treatment

- 1) In the case of new or uncontaminated tanks, a maintenance dosage rate of 1L per 4000L of fuel will provide the required protection. However, this rate will not be sufficient if previously infected fuel is introduced to the tank or system. In this event, the killer dose must be applied.
- 2) Tanks should be completely filled during the treatment process to ensure contact of all tank surface areas with **Cladocide Gold**.

Storage and Handling

For detailed instructions refer to the Material Safety Data Sheet at the back of this booklet or see the label on the container.

Store **Cladocide Gold** in a cool dry place away from direct sunlight.

Ensure container caps are screwed on tightly when not in use to prevent solid formation caused by prolonged exposure to atmospheric moisture and the associated loss of effectiveness. When using the product, ensure the lid area is free from dust and dirt prior to opening. Apart from preventing contamination of the product, this will ensure that the fuel system is not being contaminated during treatment.

Avoid contact with paintwork, as the strong solvent characteristics of **Cladocide Gold** may cause damage.

Container Sizes

Cladocide Gold is available in four convenient container sizes: 1 litre, 5 litre, 20 litre and 205 litre drums.

SPECIAL ADDITIONAL ADVANTAGES

Cladocide Gold also contains preservatives and compounds, which clean and protect your engine and improve the quality of your diesel fuel. Benefits of improved oxidation stability will, apart from preventing degradation and oxidation as a result of fungal contamination, improve storage life and increase operating efficiency.

CLADOCIDE GOLD

SUMMARY

Microbiological contamination of diesel fuel is indicated by the following symptoms:

Premature oxidation (darkening) of fuel;

Excessive sludge build-up in tank;

Reduced injector and pump life due to fouling and corrosion from by-products;

Power loss;

Excessive exhaust smoke;

Filter blockage by dark brown or black slimes; and

Difficulty in starting engine.

Should any or all of the above be experienced, it is quite possible that a microbial infection or another problem may exist within the fuel storage facility of the fuel system.

Treatment is a two-stage process:

- 1) Remove water, c
- 2) Clean the fuel tanks, repair any damage and replace the fuel filters.
- 3) Introduce the correct volume of **Cladocide Gold** to the fuel system while the tank is being refilled.

DOSAGE

- 1) Initial "KILLER" dosage of 1L per 1000L maintained for at least 12 hours.
- 2) Maintenance dosage of 1L per 4000L every fill thereafter.

It is recommended that this maintenance dosage be continued on an indefinite basis to ensure on-going protection. This dosage costs less than **half a cent a litre**. The extra cost is justified by:

- 1) an extended fuel storage life and prevention of re-contamination;
- 2) the prevention of fuel system damage.
- 3) the increase in machine performance;

CLADOCIDE GOLD

BENEFITS OF USE

- 1) Scientifically formulated as a broad-spectrum biocide designed to control microbial growths in diesel fuel.
- 2) Very low cost per litre treated. At less than half a cent per litre, there is no cheaper insurance policy for your fuel storage systems.
- 3) Antioxidant included giving;
 - reduced formation of corrosive products in fuel tanks
 - maintenance of fuel attributes (i.e. reduced oxidation)
 - extended fuel storage life.
- 4) Dead fungal and bacterial debris is trapped in filters and does not continue moving through the fuel system, damaging injectors and injector pumps.
- 5) Reduction in fuel degradation and corrosive by-products means increased life of injector pump and injectors.

MATERIAL SAFETY DATA SHEET

CLADOCIDE GOLD

Hazardous according to criteria of Worksafe Australia

IDENTIFICATION OF THE MATERIAL AND SUPPLIER	
Product Name: Recommended Use:	Cladocide Gold Additive to hydrocarbon fuels as a broad-spectrum biocide and oxidation stabiliser.
Company Identification:	Geotechnical Services Pty Ltd 41-45 Furnace Road Welshpool WA 6106
Telephone Number:	(08) 9458 8877
Facsimile Number:	(08) 9458 8857
Emergency Telephone:	(08) 9359 1003

HAZARDS IDENTIFICATION	
Human Health Hazards:	Acute
Swallowed:	Slightly toxic. May produce signs of intoxication characterised by incoordination, dizziness, drowsiness, headache, nausea, mental confusion, possibly slurred speech, and stupor, depending on the quantity of material ingested.
Eye:	Causes severe irritation, experienced as discomfort or pain, excess blinking and tear production, marked excess redness and swelling of the conjunctiva, and chemical burns of the eye.
Skin:	Brief contact is not irritating. Prolonged contact causes mild to moderate local redness and swelling. Prolonged or widespread contact may result in the absorption of potentially harmful amounts of material.
Inhaled:	Vapour from heated material may cause headache, nausea, and dizziness.
Health Effects:	Chronic Prolonged or repeated overexposure to mist or vapour generated at high temperatures may result in the inhalation of harmful amounts of material.
Environmental Hazards:	Does not bioaccumulate. Acute toxicity - fish : LC50 : >100 mg/L Acute toxicity - daphnia : EC50 : >100 mg/L Acute toxicity - algae : IC50 : >100 mg/L

COMPOSITION / INFORMATION ON INGREDIENTS	
Appearance :	Colourless transparent liquid with mild characteristic odour.
Formula:	C ₅ H ₁₂ O ₃ , C ₆ H ₁₄ O ₃
Boiling Point:	234 deg C
Melting Point:	-68 deg C
Vapour Pressure:	0.01 mm Hg (1 atmosphere)
Specific Gravity:	0.953 (water = 1)
Flash Point:	Open Cup 91 deg C
pH:	(N/A)
Solubility in water:	Sol. g/l (25 deg C)
Flammability Limits (as percentage volume in air)	
Lower Explosion Limit:	0.9
Upper Explosion Limit:	16
<u>Other Properties</u>	Vapour density (air = 1) = 5.6 Autoignition temperature = 215 deg C
<u>Ingredients</u>	
Chemical Entity	CAS No. Proportions (%)
DIETHYLENE GLYCOL MONOMETHYL ETHER:	>60
DIETHYLENE GLYCOL MONOBUTYL ETHER:	[112-34-5] <30
OTHER/ANTIOXIDANTS:	[128-37-0] <3

FIRST AID MEASURES	
Swallowed	If patient is fully conscious, give two glasses of water. Induce vomiting. Obtain medical attention.
Eye	Immediately flush eyes with water and continue washing for at least 15 minutes. Obtain medical attention without delay, preferably from an ophthalmologist.
Skin	Remove contaminated clothing. Wash skin with soap and water. Obtain medical attention if irritation persists. Wash clothing before re-use.
Inhaled	Remove to fresh air. Obtain medical attention if symptoms persist. Ensure an eye bath and safety shower are available and ready for use.
Advice to Doctor	There is no specific antidote. Treatment of overexposure should be directed at the control of symptoms and the clinical condition of the patient

FIRE FIGHTING MEASURES	
Hazards from Combustion Products	Burning can produce the following combustion products : carbon monoxide and/or carbon dioxide.
Extinguishing Media	Apply alcohol-type or all-purpose-type foam by manufacturer's recommended techniques for large fires. Use carbon dioxide or dry chemical media for small fires.
Special Protective Equipment & Precautions for Fire Fighters	Fire-fighters should wear full protective clothing including self- contained breathing apparatus.

ACCIDENTAL RELEASE MEASURES	
Spills	Clean-up personnel should wear full protective clothing including self-contained breathing apparatus in confined spaces. Remove all sources of ignition - NO SMOKING. Prevent contamination of soil and water. Prevent from spreading into drain, ditches or rivers by using sand, earth, or other appropriate barriers.
Disposal	Dispose of in accordance with all Local, State and Federal regulations at an approved waste disposal facility by incineration.

HANDLING AND STORAGE	
Storage / Transport	Store in a cool, dry area away from direct heat or flames. Store in tightly sealed containers. Use with adequate ventilation. Use spark-proof tools and explosion-proof equipment. Do not pressurise, cut, weld, braze, solder, drill, grind or expose containers to heat, sparks or open flames.

EXPOSURE CONTROLS / PERSONAL PROTECTION	
Engineering Controls	General (mechanical) room ventilation is expected to be satisfactory. Clean up affected areas with liquid-absorbent material.
Personal Protection	Wear appropriate protective eyeglasses or chemical safety goggles. Wear appropriate gloves and protective clothing to minimise contact with skin. Always wear an approved respirator when vapour concentrations are high.

PHYSICAL AND CHEMICAL PROPERTIES

Appearance :	Colourless transparent liquid with mild characteristic odour.
Formula :	C ₅ H ₁₂ O ₃ , C ₆ H ₁₄ O ₃
Boiling Point :	234 deg C
Melting Point :	-68 deg C
Vapour Pressure :	0.01 mm Hg (1 atmosphere)
Specific Gravity :	0.953 (water = 1)
Flash Point :	Open Cup 91 deg C
pH :	(N/A)
Solubility in water :	Sol. g/l (25 deg C)
Flammability Limits	(as percentage volume in air)
Lower Explosion Limit :	0.9
Upper Explosion Limit :	16
Vapour density (air = 1)	5.6 Autoignition temperature = 215 deg C
	Do not distill to dryness. Avoid excessive temperature or prolonged reflux, such as in batch distillations. Avoid strong alkalis, high temperatures in the presence of strong bases, acids or strong oxidising agents

STABILITY AND REACTIVITY

Flammability	This material has a relatively low autoignition temperature; 228 degrees C. Combustible liquid. Hazardous polymerisation will not occur.
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TOXICOLOGICAL INFORMATION

Toxicity Data	Oral LD ₅₀ = 2400 mg/kg (Mouse) ; 2200 mg/kg (Rabbit) ; 5660 mg/kg (Rat). Dermal LD ₅₀ = 2700 mg/kg (Rabbit). Inhalation LC ₅₀ = not available. Pregnant women should not be exposed to the product.
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ECOLOGICAL INFORMATION

Bioaccumulation	Does not bioaccumulate. Acute toxicity - fish : LC ₅₀ : >100 mg/L Acute toxicity - daphnia : EC ₅₀ : >100 mg/L Acute toxicity - algae : IC ₅₀ : >100 mg/L
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DISPOSAL CONSIDERATIONS

Disposal	Dispose of in accordance with all Local, State and Federal regulations at an approved waste disposal facility by incineration.
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TRANSPORT INFORMATION

UN No.:	N/A
UN Proper Shipping Name:	Cladocide Gold
Dangerous Goods Class:	N/A
Subsidiary Risk:	None Allocated
Hazchem Code:	N/A
Pack Group:0	0
EPG:	N/A
Poisons Schedule:	N/A

REGULATORY INFORMATION

Hazard	IRRITANT
Risk Phrases	R36 Irritating to eyes. R61 May cause harm to unborn child.
Safety Phrases	S26, S53-24/25-45 In case of contact with eyes, rinse immediately with plenty of water and contact a doctor or Poisons Information Centre. In case of accident or if you feel unwell, contact a doctor or Poisons Information Centre immediately.

OTHER INFORMATION

Poisons Information Centre	131 126
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LABORATORY SERVICES

Geotech is a NATA registered specialised lubricant and fuel analysis laboratory. We pride ourselves in offering one of the finest machine maintenance monitoring systems available in this country today. The service we offer enables you, the machine operator, to pin point potential problems before they happen, scheduling down time in a cost effective way. Our fully equipped laboratory is specifically geared to analyse new and used engine, transmission and hydraulic oils, greases, coolants and fuels. The tests we are equipped to run include;

Wear metals (21 elements)

Flash point (Fuel dilution)

Total Base Number and Total Acid Number

Viscosity

Oxidation and nitration

Particle counts and sizing

Water content

Microbial Contamination Detection

Ferrography

Oxidation stability (RBOT)

Oil analysis is an analytical method of knowing what is going on inside your machinery without dismantling it, often pin-pointing problems faster, cheaper and more accurately than a complete component disassembly. When it does come time for repairs it will be corrected completely, first time.

Used oil analysis can also

- tell you whether or not you are using the right oil,
- reduce machinery downtime,
- ensure the correct repairs are made first time,
- match service intervals to application and
- help plan machine maintenance through the detection of;
 - cylinder wall liner wear
 - imminent bearing failure,
 - piston and ring wear,
 - gasket and seal leaks,
 - valve problems,
 - coolant leaks,
 - filter & contamination problems,
 - oil breakdown,
 - fuel dilution and
 - transmission, hydraulic including final drive problems.

Geotech's oil analysis is most effective when used as part of an on-going maintenance program. This allows you to develop a 'trend pattern' of the machine's work load, operating conditions and normal levels of wear, contaminants and contaminant burdens.

Geotech's oil and fuel analysis program will save you money when used as part of a regular maintenance program by;

- detecting component failure at early stages,
- replacing costly failures during operating periods with a scheduled preventative maintenance approach and
- monitoring lubricant condition to better judge required service intervals.

All samples can be analysed and interpreted within **48 hours** or less.

You will received a detailed report containing;

- analysis results,
- comments and recommendation and
- graphical representation in the form of a trend plot if required.

We will also adapt our service to meet your specific information requirements.

Any abnormalities will be highlighted to enable you to make fast, accurate service decisions which is vital when it comes to the bottom line. We pride ourselves on our technical and service support. If you need any help our experienced technical staff will be very pleased to offer their assistance. Call us today to arrange more effective maintenance for your fleet, big or small.

NOTICE

Our recommendations for use of these products are based upon tests believed to be reliable. Because the use of these products is beyond the control of the manufacturer, no guarantee, expressed or implied, is made to the effects of such or the results to be obtained if not used in accordance with directions or established safe practice.

The buyer must assume all responsibility, including injury or damage resulting from its misuse as such, or in combination with other materials.