



### **The Environmental Benefits of Kilfrost GEO**

In terms of environmental impact, Kilfrost Geo is a superior choice of heat transfer fluid for closed loop ground and water source heat pumps compared to standard glycol and ethanol based products.

Similarly to the glycol (ethylene and propylene) and ethanol based products, Kilfrost Geo is not classified as hazardous to fish, where testing has shown LC50 values greater than 1000mg/l. Classification criteria for the lowest level of acute aquatic toxicity is at <100mg/l.

Both the glycol and ethanol based products have been shown to be readily biodegradable to greater than 97% in less than 5 days and as such are not bioaccumulative or persistent, however this rate of biodegradation causes a rapid depletion of oxygen in water systems due to the high BOD<sub>5</sub> and COD <sup>1</sup> level of these products. Aquatic organisms require the oxygen dissolved in the water to sustain life, when oxygen levels are reduced, this has a detrimental effect upon aquatic life.

Kilfrost GEO is also rapidly biodegradable; however the BOD and COD levels for Kilfrost Geo are significantly lower at around 1/3 of the BOD of ethylene glycol (Table 1). In consequence, on accidental release into the environment, Kilfrost GEO will consume less oxygen from aquatic systems than any glycol or ethanol based product.

**Table 1: BOD and COD of Heat Transfer Fluids**

	<b>Ethylene Glycol</b>	<b>Propylene Glycol</b>	<b>Ethanol</b>	<b>Kilfrost GEO</b>
<b>BOD<sub>5</sub></b>	<b>700,000mg/L</b>	<b>1,360,000mg/L</b>	<b>1,250,000mg/L</b>	<b>250,000mg/L</b>
<b>COD</b>	<b>1,290,000mg/L</b>	<b>1,560,000mg/L</b>	<b>2,080,000mg/L</b>	<b>670,000mg/L</b>

In addition to its more environmentally friendly biodegradation pathway, Kilfrost GEO does not contain any ingredients listed as priority substances under the Water Framework Directive, including those substances listed under list I and List II in the repealed old groundwater directive 80/68/EEC.

In conclusion, Kilfrost GEO offers a more favorable option than glycol and ethanol based products with regard to the potential to disturb the oxygen balance within the aquatic environment, making it particularly suitable for closed loop water source heat pumps.

<sup>1</sup> . BOD is the measure of the amount of dissolved oxygen required in a water system to break down to product by microorganisms. COD is the measure of the amount of oxygen demanded to chemically break down compounds in a water system.