INDEPENDENT MARKETER OF SPECIALITY OILS AND FLUIDS

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SIPDRILL RS: Sustainable, High-Performance Drilling Base Fluids

Introduction

- **SIPDRILL RS** is believed to be the first renewable, hydrocarbon drilling base fluid, for use in non-aqueous drilling muds.
- Designed to match the performance advanced synthetic base fluids (SBF's) such as iso-paraffins or olefins.
- Product designed through SIP and Novvi collaboration:

What is SIPDRILL RS?

- Novvi, utilising Amyris' proprietry fermentation, partially hydrogenates the standard product of this pathway, the isoprenoid β-Farnesene.
- Derived from sustainable sugar sources, the development of renewable n-hexadecene has allowed SIP and Novvi to design at truly renewable and high performance drilling base fluid

Characteristics of SIPDRILL RS

- Excellent flash point, pour point and rheological properties, shown in table 1
- High levels of renewability
- Currently completing the eco-toxicological requirements for the Gulf of Mexico (EPA-821-B-00-013).
- Test work for the North Sea *Offshore Chemical Notification Scheme* (OCNS) has been completed. Results achieved are outstanding and can be seen in Table 2..

	SIPDRILL RS (North Sea)	SIPDRILL RS (GoM)
Density at 20°C, g/mL	0.7699	0.775
Viscosity at 40°C, cSt	1.96	2.43
Flash Point, °C	92	100
Pour Point, °C	-61	-12°C
Renewable Content, % wt.	~73%	~85%

Table 1: Physical properties of SIPDRILL RS

	SIPDRILL RS
Marine Algae – *Phaeodactylum tricornatum*. 72 hour toxicity EC_{50}	>3200 mg/L
Marine Copepods – *Acartia tonsa*. 48 hour toxicity, EC_{50}	> 3200 mg/L
Marine Amphipod – *Corophium volutator*. 10 day toxicity LC_{50}	1317 mg/kg dry sediment
Fish Acute Toxicity – *Cyprinodon variegatus*. 96 hour toxicity LC_{50}	> 1001 mg/L
Aerobic Biodegradability in Seawater , 28 day	62%

*Table 2: Eco-Toxicity results for **SIPDRILL RS** (North Sea)*

Planned Production of SIPDRILL RS

- Final phase testing to be completed shortly.
- SIP anticipates that production and sales of **SIPDRILL RS** will begin in the fourth quarter of 2016.
- Whilst initial production and sales will be to support small scale exploration and trial batches, SIP anticipate that **SIPDRILL RS** will be produced in the thousands of tonnes per annum quantities by 2018.
- SIP believe that **SIPDRILL RS** will lead the market area in renewability, creating the standard for drilling base fluids of this nature going forward.

Contact Information

For further information regarding **SIPDRILL RS** please contact:

- Glen Cockroft, Director of Drilling & Speciality Fluids glencockroft@sip.com

Further Reading and References

- **US EPA, 2000**. *Development Document for Final Effluent Limitations Guidelines and Standards for Synthetic-Based Drilling Fluids and other Non-Aqueous Drilling Fluids in the Oil and Gas Extraction Point Source Category*. Washington, DC: EPA. EPA-821-B-00-013. Available from here.
- **Moreira, M., Gurgel, A.C. and Seabra, J.E., 2014**. *Life Cycle Greenhouse Gas Emissions of Sugar Cane Renewable Jet Fuel.* Environmental science & technology, 48(24), pp.14756-14763.

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