A constantly evolving situation

PANOLIN HLP SYNTH®
Deck equipment
ROV’s

PANOLIN ATLANTIS®
Control Lines
Wellhead units
ROV’s
Miscibility

- PANOLIN ATLANTIS / sea water; absolute max 0.1%
- PANOLIN ATLANTIS / mineral oil; max 5%
- PANOLIN ATLANTIS / PANOLIN HLP SYNTH
Water in oil is a problem

“Preventing water ingress is cheaper than trying to remove it”
Oil in water is an environmental issue

Mineral oils

PANOLIN HLP SYNTH
PANOLIN ATLANTIS

PANOLIN®
Swiss High-Quality Oil
Ecology – breakdown mechanism

Aerobic bacteria “digest” biodegradable lubricants

Lubricant in water  Bacteria  Biomass formed by the bacteria
### Relevant key freshwater ecotox tests for base fluid components

<table>
<thead>
<tr>
<th>Testing</th>
<th>Test Norm</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partition co-efficient</td>
<td>OECD Guideline 117</td>
<td>Solubility in water vs in octanol</td>
</tr>
<tr>
<td>Biodegradability</td>
<td>OECD 301B</td>
<td>Ultimate degradation</td>
</tr>
<tr>
<td>Aquatic toxicity</td>
<td>OECD 201</td>
<td>Algae, growth inhibition test</td>
</tr>
<tr>
<td></td>
<td>OECD 202</td>
<td>Daphnia, acute immobilisation test</td>
</tr>
<tr>
<td></td>
<td>OECD 203</td>
<td>Fish, acute toxicity test</td>
</tr>
<tr>
<td></td>
<td>OECD 209</td>
<td>Toxicity on micro-organisms from activated sludge of waste water treatment plants</td>
</tr>
<tr>
<td>Terrestrial plant toxicity</td>
<td>OECD 208</td>
<td></td>
</tr>
<tr>
<td>Toxicity to terrestrial non-</td>
<td>OECD 207</td>
<td>Earthworm, acute toxicity test</td>
</tr>
<tr>
<td>mammalian species</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Client: Panolin America, Inc.
Sample ID: HLP Synth 22
Test Date: July 24 – 28, 2008
Test Procedure: 96-hour Acute Survival Toxicity Test using Mysis Shrimp. Product testing was performed using the Water Accommodated Fraction (WAF). Species: Ameriomysis bahia
Test Protocol: Followed methods in EPA/621/R-02/012, the 2002 EPA protocol for conducting acute toxicity tests with freshwater and marine test species.
Test Results: LC50 > 1,000 mg/L; sample material is classified as nontoxic.
There was no observed effect at the highest concentration tested.

SUMMARY OF RESULTS:

<table>
<thead>
<tr>
<th>Sample ID</th>
<th>Test</th>
<th>Concentration (mg/L)</th>
<th>Mean Survival (%)</th>
<th>Statistical Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>HLP Synth 22</td>
<td>Lab Control</td>
<td>100</td>
<td>NOEC &gt; 1,000 mg/L</td>
<td></td>
</tr>
<tr>
<td></td>
<td>62.5</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>125</td>
<td>90</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>250</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>500</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1,000</td>
<td>90</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOEC = No Observed Effect Concentration
LC50 = Sample concentration that causes a lethal effect to 50% of the test organisms
Note: 1,000 mg/L is the highest concentration required for chemical or product testing under the EPA guidelines. Any concentration higher than 1,000 mg/L is considered nontoxic and nontoxic.

Testing Laboratory: Nautilus Environmental
5550 Morehouse Drive, Ste. 180
San Diego, CA 92121
Phone: 858-567-2333 x202

Test Result Authorization: Steve Carlson, Project Manager
Transition - OSPAR/HOCNF (PANOLIN ATLANTIS 15, 22 & 32)

- OSPAR - Dictates any fluid which may unintentionally be discharged into the marine environment is tested for its Environmental impact

- Each chemical component of the fluid is tested for Toxicity, Bioaccumulation & Biodegradation

- HOCNF - Harmonised Offshore Chemical Notification Form completed by PANOLIN and submitted for clearance to the relevant authorities in each country

- Norway: SFT Yellow
- UK: CEFAS OCNS Group E
- Netherlands: HMCS Rating R
## Relevant key saltwater ecotox tests for base oils and additives

<table>
<thead>
<tr>
<th>Testing</th>
<th>Test Norm</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biodegradability</td>
<td>• OECD 306</td>
<td>Ultimate degradation</td>
</tr>
</tbody>
</table>
| Aquatic toxicity       | • ISO 10253  
• DS/EN 14669  
• OECD 203  
• ISO/DIS 16712 | Algae (growth inhibition)  
Crustacean  
Fish, Scophthalmus maximus  
Sediment reworker acute toxicity on micro-organisms in sediment |
OSPAR approval

Active products

PANOLIN ATLANTIS 15
PANOLIN AG, Blasimuhle, CH-8322 Madetswil, Switzerland

Registration No.: 23452
Version No.: 2
Expiry Date: 08/04/2012

NL HMCS Prescreening Category: R

Application Process System: CHARM
Dose Rate: 1000000 ppm
Worst Aquatic Toxicity Test: 87.6
Number of Aquatic Toxicity Tests: 3
OCNS Group: E
100% PLOND: No

Application
Surfactant Type: CHARM
Dissolving Mud Density kg/m3: N/A
Sediment Retention: N/A
Biodegradation Value %: 6774.76
Time/Days: N/A
Protocol: N/A
Minimum Log Por: N/A
Koc: N/A
Koc Protocol: N/A
Organic C: N/A

PANOLIN
Swiss High-Quality Oil
REACH

• Risk Evaluation & Assessment of Chemical Hazards

• The offshore industry expect over 40% of manufacturers chemical/fluids currently in use to be withdrawn from the EU market because of a failure to pre-register the product

• PANOLIN products comply with the REACH requirements
Viscosity can change according to working conditions

PANOLIN ATLANTIS

ISO 15  ISO 22  ISO 32

Viscosity (mm²/s)

Sea level (1 bar)

Subsea pressure (bar)

Oil temperature 50°C

100 bar ≈ 1000m depth of water
Electrical insulation – Earthco Ltd

BS EN 60156:1996
Sets out the requirements and test methods to assess the electrical breakdown voltage of oils.

ISO 32 Mineral oil
Transformer Oil
PANOLIN ATLANTIS 22/32

Ave. 16.8kv
Ave. 22.5kv
Ave. 60.0kv
Manufacturer approvals

- Rotork
- Schilling
- SMD Hydrovision
- Bosch Rexroth
- Linde
- Saur Danfoss
- Wandfluh
- Seal manufactures
The first steps

2003 - PANOLIN HLP SYNTH supplied to Wintershall; 2005 PANOLIN ATLANTIS initiated as registered replacement

2004 - PANOLIN HLP SYNTH supplied to SMD Hydrovision
Two lubricants in use:

• PANOLIN HLP SYNTH 32 as hydraulic oil and insulating lubricant

• PANOLIN EP GEAR SYNTH 150 in the 8 gears moving the locomotive system (bogies)
UK - Global Marine – ROV’s

• Plough & A frame converted to PANOLIN HLP SYNTH 32 in May 07

• Sauer Danfoss pumps

• CARDEV Subsea filter units

• ROV converted in Oct 07 worked in the Gulf of Mexico & through the Pacific Ocean

• All continue working with no oil or water related problems
ROV’S – Hydraulics & Valve block insulation

- Valve block insulation box filled with oil
- Transformer oil is widely used
- PANOLIN HLP SYNTTH now used in ROV hydraulics and insulation boxes
- Operator benefits from the use of one grade of oil
March 09 – request for a product meeting OCNS regulations
April 09 – Order received from Fugro Singapore for the first fill in an FVC 3000 work class ROV
May 09 – Sea trials initiated
Lubricant rationalisation – Hydraulics, Electric motors & Insulating boxes
Sea trial stopped after 3 weeks of successful operation ROV converted back to mineral oil
OPCO require a CEFAS listed product & await registration notification
International availability

- Italy
- Norway
- Singapore/Asia Pacific
- The Middle East
- UK & Ireland
- USA - Gulf of Mexico
- USA – West Coast
- West Coast of Africa - pending