PANOLIN Offshore – A world of experience

A constantly evolving situation

PANOLIN HLP SYNTH®
Deck equipment
ROV‘s

PANOLIN ATLANTIS®
Control Lines
Wellhead units
ROV‘s

PANOLIN ATLANTIS

PANOLIN® Swiss High-Quality Oil

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

“Preven ress is
cheaper g it”

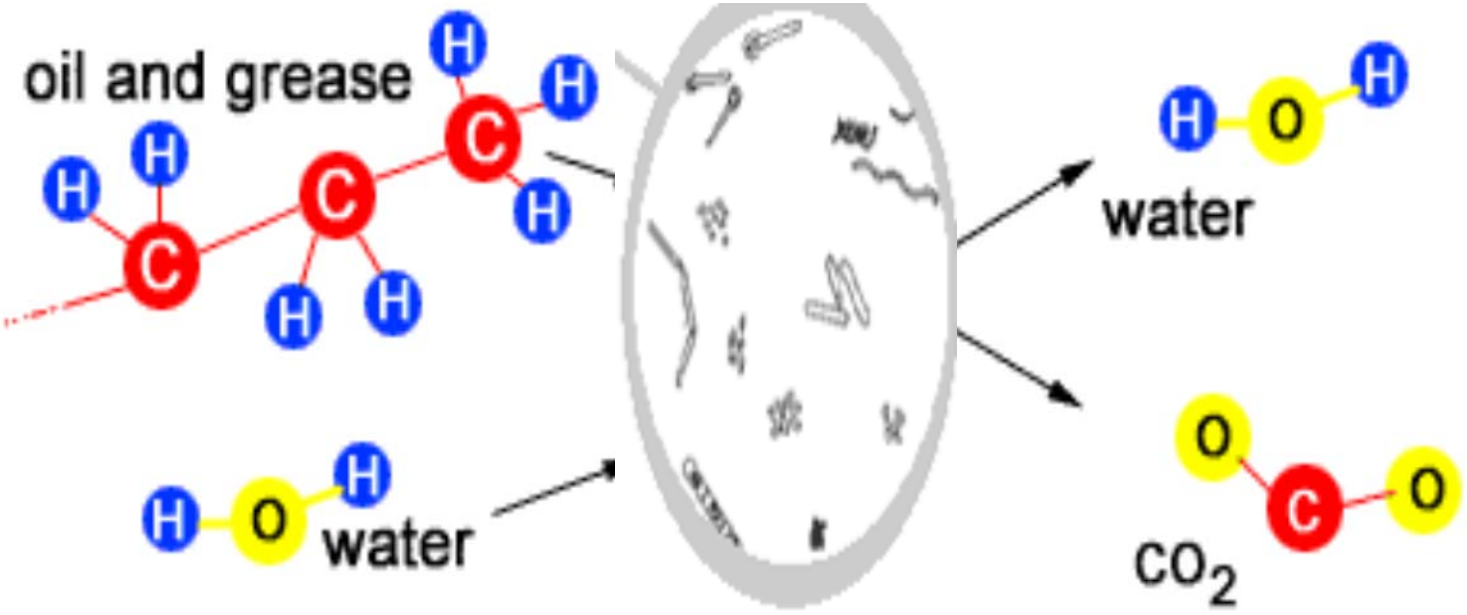
Oil in water is an environmental issue

Mineral oils

PANOLIN HLP SYNTH
PANOLIN ATLANTIS

Ecology – breakdown mechanism

Aerobic bacteria “digest“ biodegradable lubricants



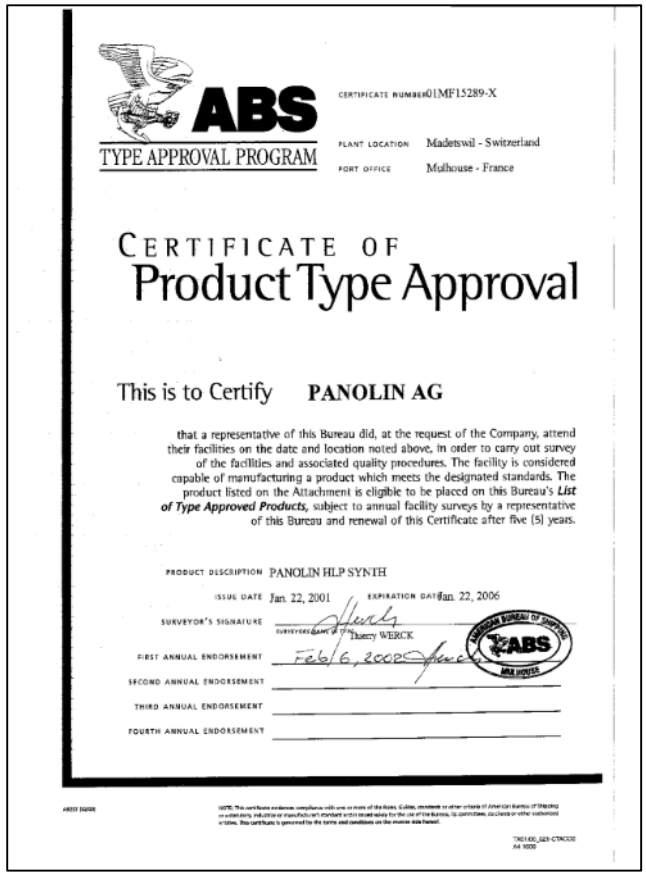
Lubricant in water **Bacteria** **Biomass formed by the bacteria**

Freshwater Ecotoxicology – PANOLIN HLP SYNTH

Relevant key freshwater ecotox tests for base fluid components

Testing	Test Norm	Remarks
Partition co-efficient	OECD Guideline 117	Solubility in water vs in octanol
Biodegradability	OECD 301B	Ultimate degradation
Aquatic toxicity	OECD 201 OECD 202 OECD 203 OECD 209	Algea, growth inhibition test Daphnia, acute immobilisation test Fish, acute toxicity test Toxicity on micro-organisms from activated sludge of waste water treatment plants
Terrestrial plant toxicity	OECD 208	
Toxicity to terrestrial non-mammalian species	OECD 207	Earthworm, acute toxicity test

PANOLIN HLP SYNTH



ABS

TYPE APPROVAL PROGRAM

CERTIFICATE NUMBER 01MF15289-X

PLANT LOCATION Madetswil - Switzerland

PORT OFFICE Mulhouse - France

CERTIFICATE OF

Product Type Approval

This is to Certify **PANOLIN AG**

that a representative of this Bureau did, at the request of the Company, attend their facilities on the date and location noted above, in order to carry out survey of the facilities and associated quality procedures. The facility is considered capable of manufacturing a product which meets the designated standards. The product listed on the Attachment is eligible to be placed on this Bureau's ***List of Type Approved Products,*** subject to annual facility surveys by a representative of this Bureau and renewal of this Certificate after five (5) years.

PRODUCT DESCRIPTION PANOLIN HLP SYNTH

ISSUE DATE Jan. 22, 2001 EXPIRATION DATE Jan. 22, 2006

SURVEYOR'S SIGNATURE Thierry WERCK

FIRST ANNUAL ENDORSEMENT Feb 6, 2002

SECOND ANNUAL ENDORSEMENT

THIRD ANNUAL ENDORSEMENT

FOURTH ANNUAL ENDORSEMENT

Nautilus Environmental
San Diego Bioassay Laboratory
August 6, 2008

Client: Panolin America, Inc.

Sample ID: HLP Synth 22

Test Date: July 24 – 28, 2008

Test Procedure: 96-hour Acute Survival Toxicity Test using Mysid Shrimp. Product testing was performed using the Water Accommodated Fraction (WAF). Species: *Americamysis bahia*

Test Protocol: Followed methods in EPA/821/R-02/012, the 2002 EPA protocol for conducting acute toxicity tests with freshwater and marine test species.

Test Results: LC_{50} > 1,000 mg/L; sample material is classified as nontoxic. There was no observed effect at the highest concentration tested.

SUMMARY OF RESULTS:

Sample ID	Test Concentration (mg/L)	Mean Survival (%)	Statistical Results
HLP Synth 22	Lab Control	100	**NOEC > 1,000 mg/L**
	62.5	100	
	125	90	**LC_{50} > 1,000 mg/L**
	250	100	
	500	100	
	1,000	90	

NOEC = No Observed Effect Concentration

LC_{50} = 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 inconsequential and nontoxic.

Testing Laboratory:
Nautilus Environmental
5550 Morehouse Drive, Ste. 150
San Diego, CA 92121
Phone: 858-587-7333 x202

Test Result Authorization: Steve Carlson 8/6/08

Steve Carlson, Project Manager

PANOLIN®

Swiss High-Quality Oil

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

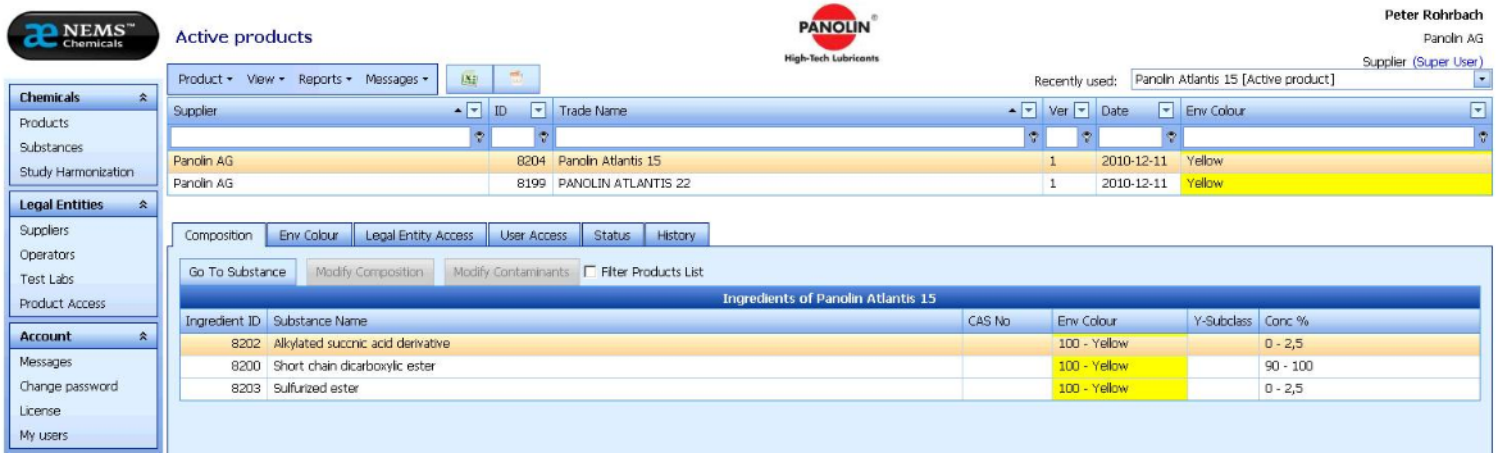
•**Norway**	SFT	Yellow
•**UK**	CEFAS	OCNS Group E
•**Netherlands**	HMCS	Rating R

Saltwater Ecotoxicology – PANOLIN ATLANTIS

Relevant key saltwater ecotox tests for base oils and additives

Testing	Test Norm	Remarks
Biodegradability	•OECD 306	Ultimate degradation
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



Cefas

DEPARTMENT OF ENERGY & CLIMATE CHANGE

State Supervision of Mines Ministry of Economic Affairs

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

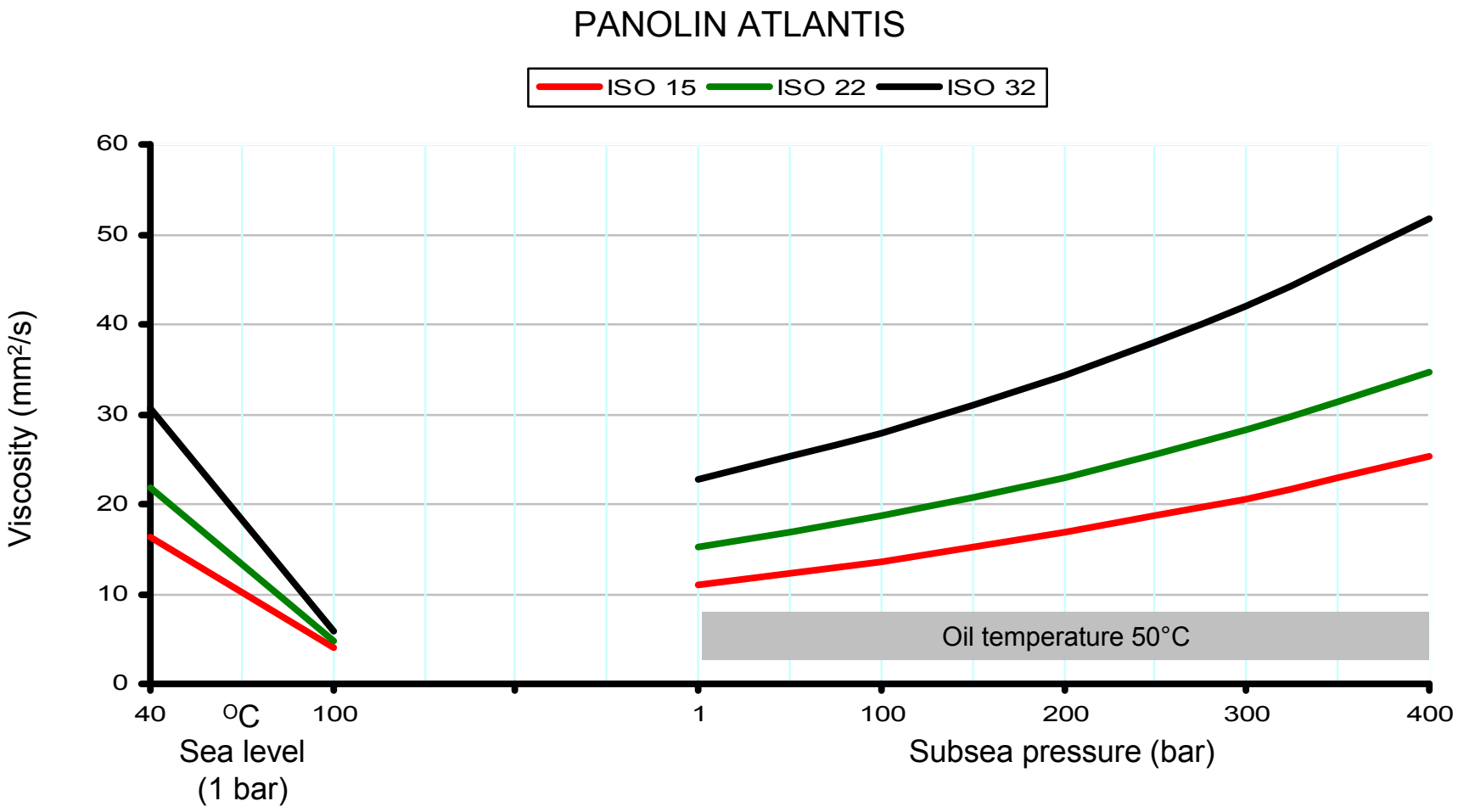
Application Process System	*Dose Rate*	*Worst Aquatic Toxicity Test*	*Number of Aquatic Toxicity Tests*	*OCNS Group*	*100% PLONOR*
CHARM is not applicable to this process system	*1000000 ppm*	*87.6*	*3*	*E*	*No*

Application	*Surfactant Type*	*Drilling Mud Density kg/m3*	*Sediment Reworker*	*Biodegradation Value/ %*	*Time/Days*	*Protocol*	*Minimum Log Po/w*	*Koc*	*Koc Protocol*	*Organic C Content*
CHARM N/A	*N/A*	*N/A*	*6774.76*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*

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

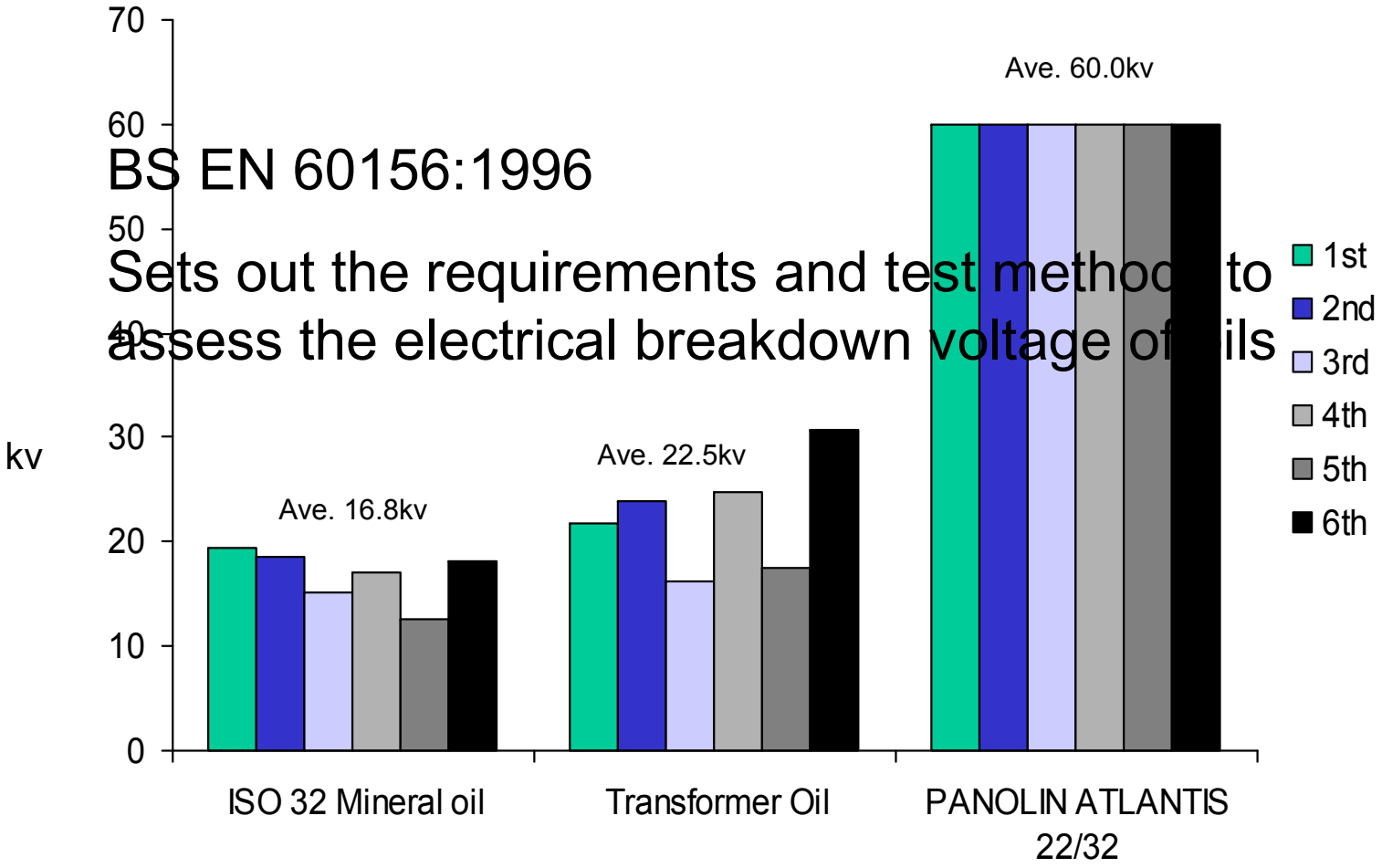


100 bar ≈ 1000m depth of water

Electrical insulation – Earthco Ltd

BS EN 60156:1996

Sets out the requirements and test method to assess the electrical breakdown voltage of oils



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

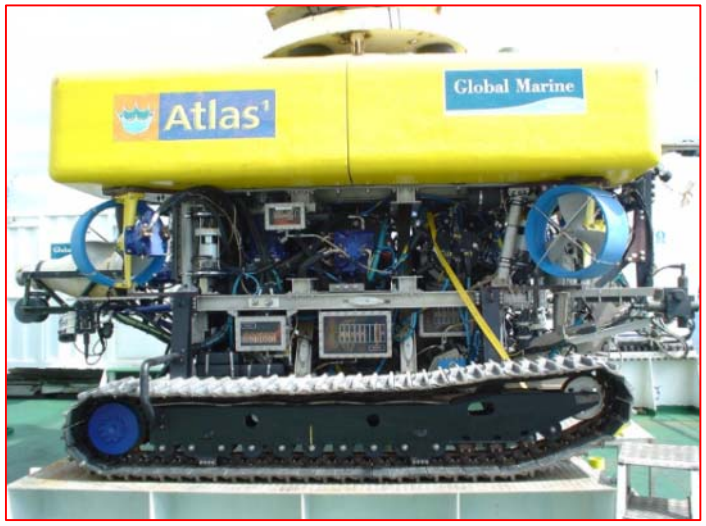
2004 - PANOLIN HLP SYNTH supplied to SMD Hydrovision

Saipem-Sonsub (Kashagan Oil Field 2006)

Two lubricants in use:

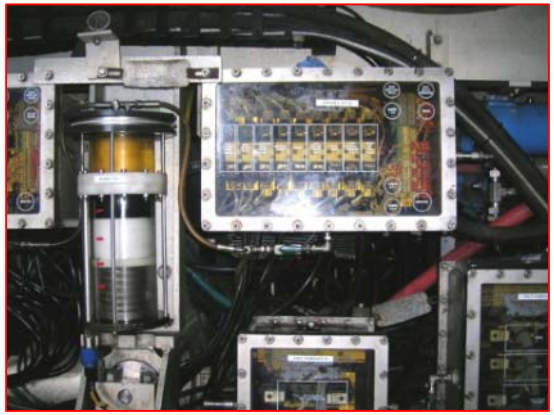
- PANOLIN HLP SYNTH 32 as hydraulic oil and insulating lubricant
- PANOLIN EP GEAR SYNTH 150 in the 8 gears moving the locomotive system (bogies)

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 SYNTH now used in ROV hydraulics and insulation boxes
- Operator benefits from the use of one grade of oil

Fugro – PANOLIN ATLANTIS 32

- 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

OCEANEERING – PANOLIN ATLANTIS 22 (2010)

International availability

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