

LIFE PRESERVER

BIO 68
HYDROX
STERESELECTIVE

VICKERS & SONS
LLOYD'S REGISTER
VCMS

LLOYD'S REGISTER
PRODUCT CERTIFICATION

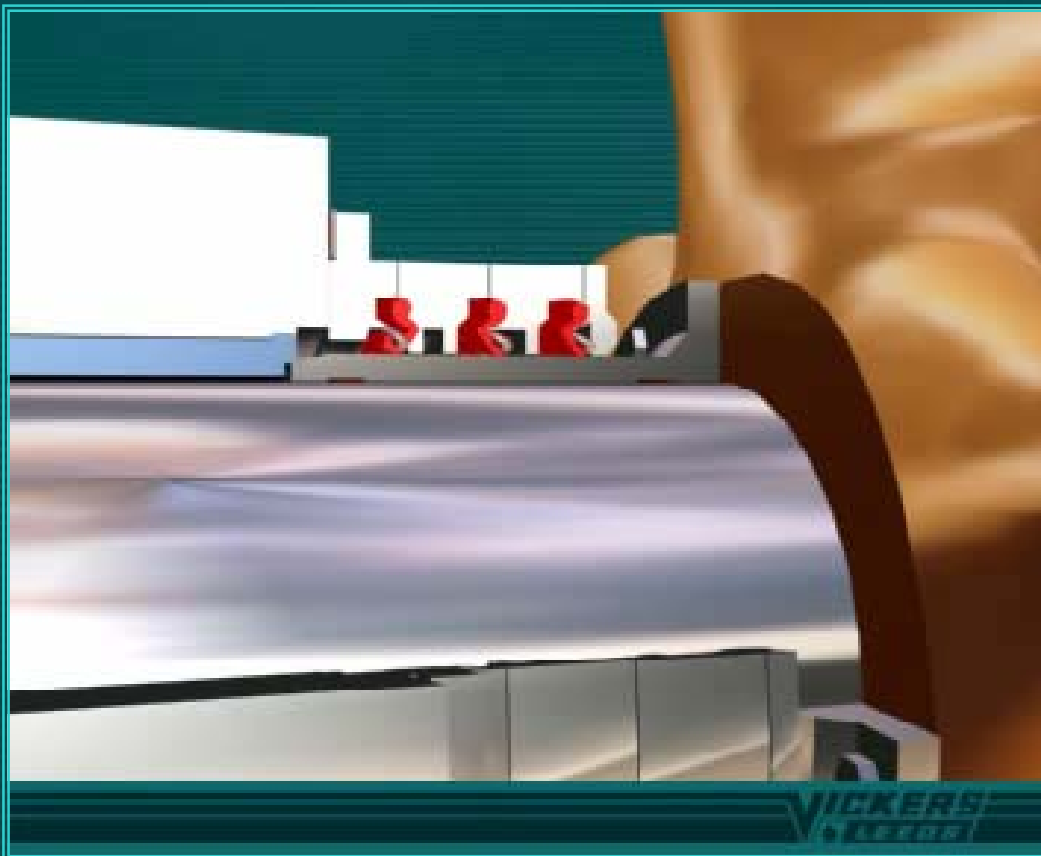
BUREAU VERITAS

ABS
TYPE APPROVAL PROGRAM

Seatrade AWARDS
2003
WINNER

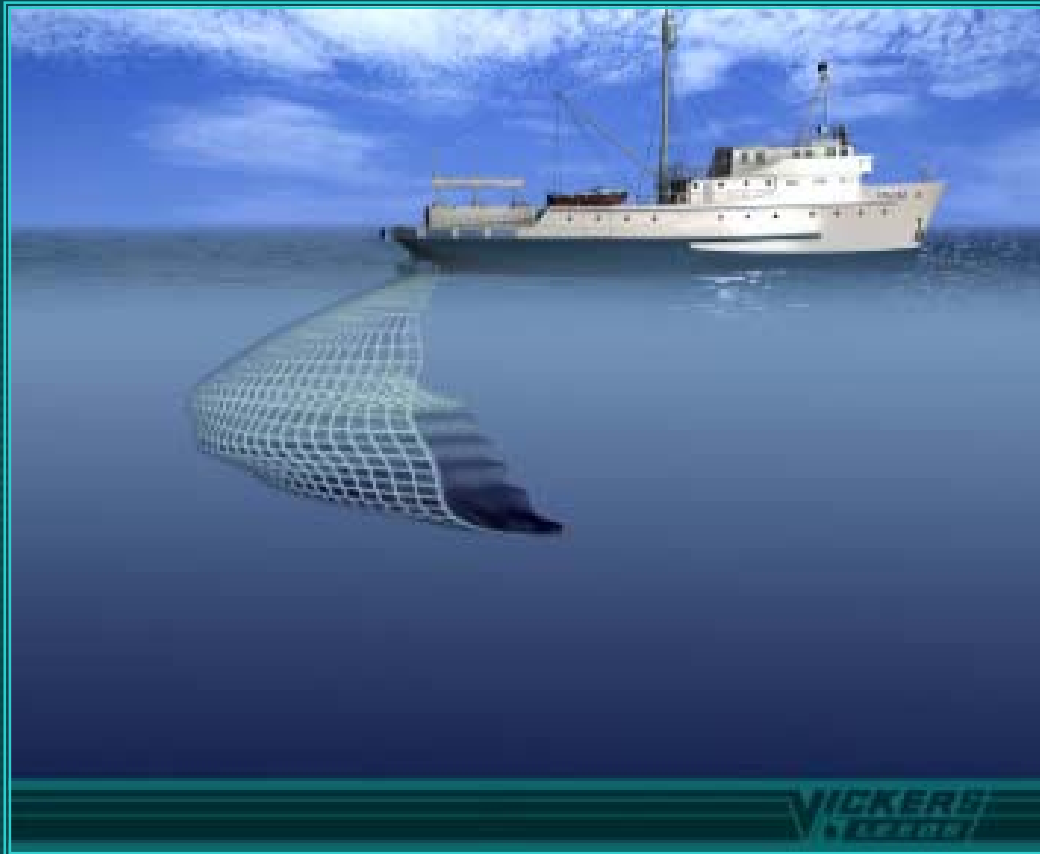


Lip Seal Arrangement



Causes of Seal Leakage

- Debris

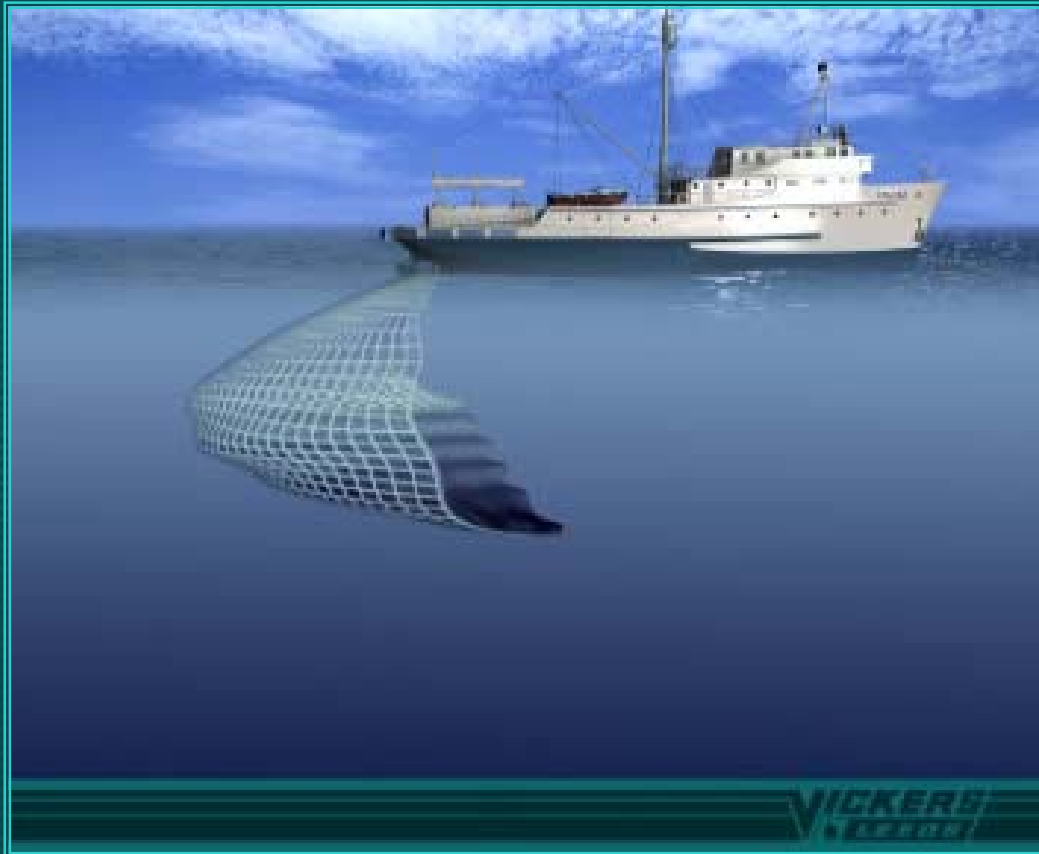


VICKERS
VICKERS

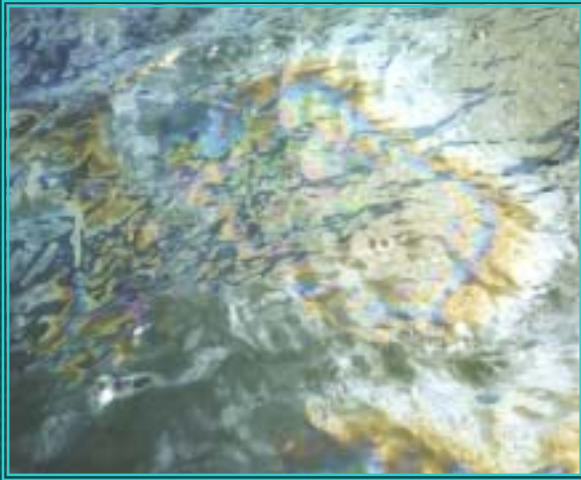


Causes of Seal Leakage

- Debris
- Vibration
- Misalignment
- Pressure Differences



Seal Leakage Problems



- Pollution / Environmental Damage
- Port Bans
- Impounding
- Heavy Fines / Imprisonment
- Operator Image / Public Relations



- Salt Water Corrosion



- Poor Bearing Lubrication



Relevant Pollution Standards Examples

- International Marine : GHS / GESAMP / IMO
- National Marine : US Clean Water Act
Japanese Law No. 136
- Local Marine : Göteborg Harbour Clean Ship
- International Environmental : European Eco-Label
ISO 15380 Hydraulic Fluids
- National Environmental : ASTM D 6046 Hydraulic Fluids
German WGK Rating
Blue Angel
Nordic White Swan





THE "CLEAN SHIP" – a possible option

On the clean ship...

7. only environmentally adapted oil is used in the stern tube. The base oil is rapidly degraded in the environment, the additives do not have a high toxicity and they are not persistent nor have they shown to be bioaccumulating. The additives do not constitute a serious health risk and the oil is compatible with the seals that are used.



HYDROX BIO is recognised in the report



Common Criteria

All Pollution Standards

- Biodegradability
- Acute Aquatic Toxicity
- Bioaccumulation Potential

Additional Criteria

- (Sheening)
- (Fit For Purpose)



Biodegradation Process

Test

Process

Lubricant

+

Micro-organisms, oxygen
& water & nutrients



Carbon dioxide, water
and biomass

Primary
Biodegradation

Inherent
Biodegradation

Ultimate
Biodegradation

Ready
Biodegradation



CEC-L-33-A-93

OECD 302

ISO 9439

ASTM D-5864

EPA Shake Flask

OECD 301 A to F

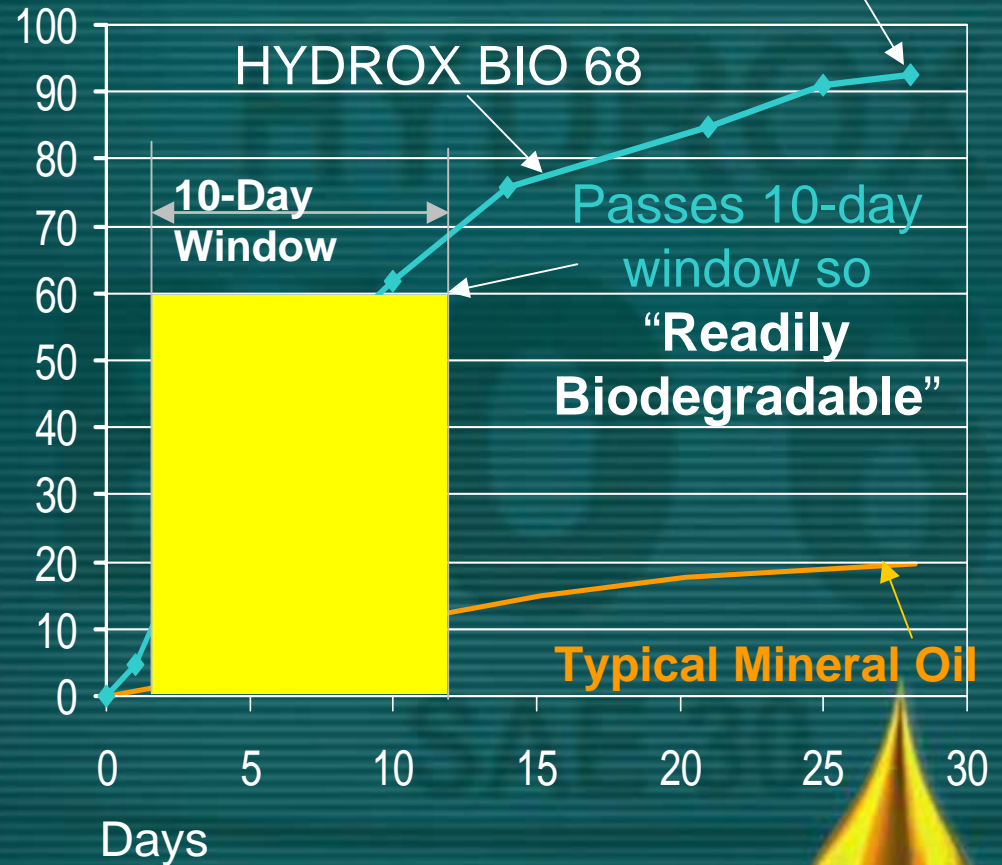


HYDROX BIO 68 – OECD 301B Ready Biodegradability



Ultimate biodegradability = 92.5%

Biodegradability (%)



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HYDROX BIO 68 Acute Aquatic Toxicity

The Aquatic Food Chain →



+



+



Algae
A primary producer at base of food chain

Species :

Fish

Crustacea

Algae

Represents :

Vertebrates

Invertebrates

Plants

Test Method :

OECD 203

OECD 202

OECD 201

BIO 68 Rating :

Non-toxic

Non-toxic

Non-toxic

Highly Toxic	=	0.1 - 1 ppm*
Moderately Toxic	=	1 - 10 ppm*
Slightly Toxic	=	10 - 100 ppm*
Practically Non Toxic	=	100 - 1000 ppm*
Non-toxic/ Relatively Harmless	>	1000 ppm*



* Concentration of product (parts per million) required to kill or inhibit growth of 50% of relevant species

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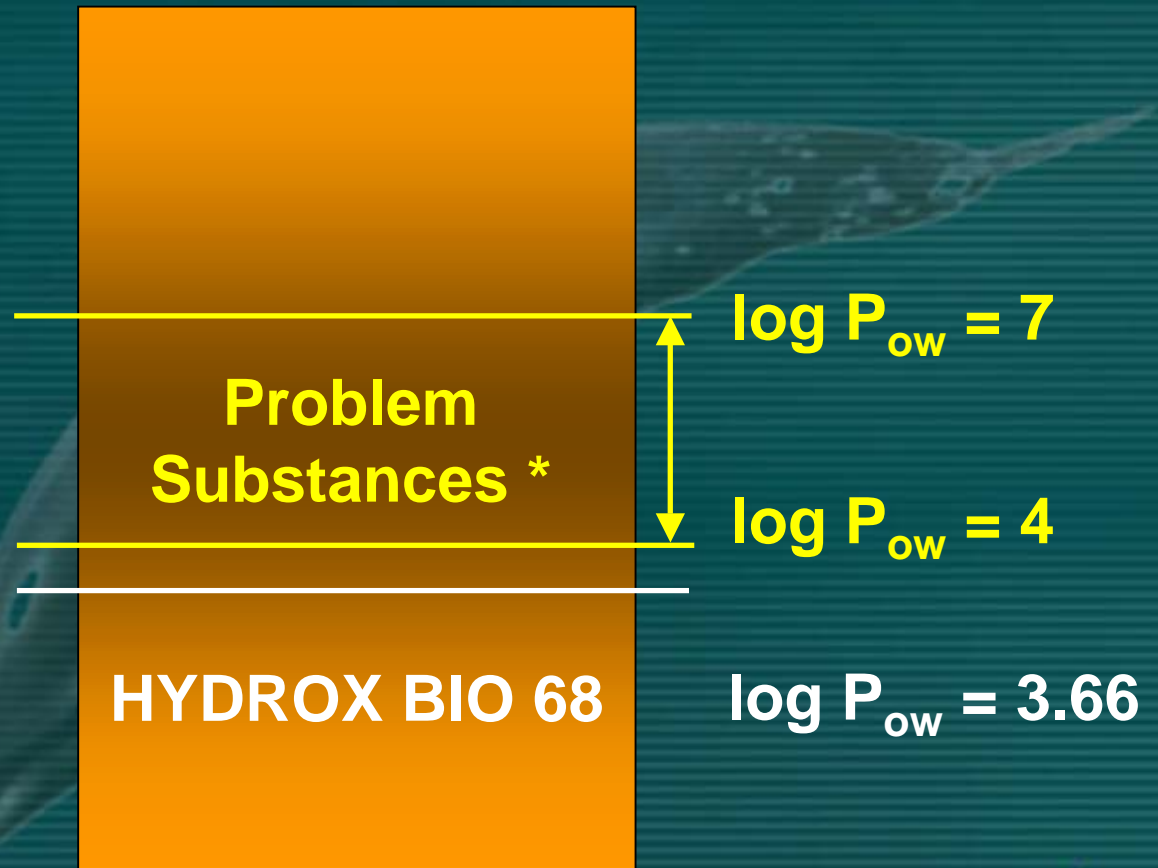
Bioaccumulation Potential

OECD 107 Test

Build up of organic chemicals in fatty tissues

Hard to process

Low potential for bioaccumulation



* According to GHS / GESAMP

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Sheening



Typical
System Oil

System Oil
Base

HYDROX
Bio 68

Vegetable Oil
Base

Hydraulic
White Oil

White Oil
Base

All of these would be regarded as sheening by the USCG

US Clean Water Act :

No surface sheen

No dispersant additives allowed

Must not sink to bottom



Seal Compatibility

HYDROX BIO 68

Types of Seal :

Nitrile

Fluorocarbon

Critical Factors :

Hardness

Tensile Strength

Elongation

Shrinkage & Swelling

Kind to Seals





Emulsifiable

Traps water that enters the system



- Prevents Salt Water Corrosion
- Prevents Bearing Damage & Wear





- Commercialised in 2003
- Supplied to more than 165 vessels



- Vessels with normal water ingress levels
- Vessels with seal damage
- Vessels in environmentally sensitive areas
- Vessels with lip and / or face seals
- Vessels with white metal or Railko bearings

Stern Tube Bio Oils - Conclusion

HYDROX BIO

- Readily Biodegradable
- Non-Toxic To Aquatic Environment
- Low Potential for Bioaccumulation
- Protects system against water ingress
- Compatible with existing designs

