Understanding Biodegradable Lubricants:

An Introduction to 'Green' Oil in Hydraulic Systems Offshore

International Marine Contractors Association

www.imca-int.com

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There are two core activities that relate to all members:

- Competence & Training
- Safety, Environment & Legislation

The Association is organised through four distinct divisions, each covering a specific area of members' interests: Diving, Marine, Offshore Survey, Remote Systems & ROV.

There are also five regional sections which facilitate work on issues affecting members in their local geographic area – Asia-Pacific, Central & North America, Europe & Africa, Middle East & India and South America.

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Appendices

1 Introduction

A question often heard in offshore/marine circles is "what is a green oil?" and that also leads on to "what is an oil spill?". Following a successful workshop at the IMCA annual seminar in 2012 on the subject matter, a number of contributors have compiled the following information to try to take away some of the confusion surrounding these questions. It is not intended to be wholly definitive and the reader will quickly appreciate that there is a degree of chemical composition and science to be aware of to better understand the information; where needed, practical explanations or reference reading have been included. In addition, there is significantly more detailed and complex data available to the industry, and the aim of this guidance is only to provide an initial point of reference. Finally, it should be noted that this guidance has been largely drawn from European or American sources. When operating in other regions it is imperative that local information is used to ensure compliance with local 'oil spill regulations'.

The increase in use of environmentally sound hydraulic fluids (ESHF) can be attributed to a growing awareness of the potential environmental impact and the need to observe legal and regulatory requirements. Biodegradable lubricants in the offshore and marine industries have been in use since 1985, as an alternative to mineral oil based products, which only degrade slowly and inadequately. Choosing the correct type of fluid for a particular application can be problematic, given that most types offer some degree of biodegradability, however differ in performance and regulatory compliance. This document, while not intended to be a definitive specification or instruction, offers some guidance for the operator when determining the correct choice of ESHF.

Whilst the information can be applicable to any hydraulic system, the focus for the document is on hydraulic systems associated with remotely operated vehicle (ROV) systems, including but not limited to the vehicle, the launch and recovery system (LARS), the deck hydraulic power unit (HPU) and associated ROV tooling.

2 Glossary

CEFAS	Centre for Environment, Fisheries and Aquaculture Science (UK)
DECC	Department of Energy & Climate Change (UK)
ECL	Environmentally considerate lubricant
ESHF	Environmentally sound hydraulic fluid
HEES	Hydraulic oil environmental ester synthetic
HEPG	Hydraulic oil environmental polyglycol
HEPR	Hydraulic oil environmental polyalphaolefins and related products
HETG	Hydraulic oil environmental triglyceride
HOCNF	Harmonised Offshore Chemical Notification Format
HPU	Hydraulic power unit
ISO	International Organization for Standardization
KLIF	Climate and Pollution Agency (Norway)
LARS	Launch and recovery system
MEA	Ministry of Economic Affairs (Netherlands)
NPD	Norwegian Petroleum Directorate
OCNS	Offshore Chemical Notification Scheme
OECD	Organisation for Economic Co-operation and Development
OSPAR	Oslo and Paris Commissions (the Convention for the Protection of the marine Environment of the North-East Atlantic)
PPM	Parts per million
ROV	Remotely operated vehicle
TAN	Total acid number
VI	Viscosity index

3 ESHF/ECL Classifications: HETG, HEES, HEPR, HEPG

Biofluids are defined in four major classifications: HETG, HEES, HEPR and HEPG.[1]

- HETG (rapeseed) vegetable based fluids are readily biodegradable; however these fluids were primarily designed for use in total loss applications and best suited for low temperature, low pressure systems. These fluids can only withstand operating temperatures below 70°C and if used in the wrong application can lead to lacquering of components. This type of fluid can also become unstable when contaminated with water.
- HEES fluids (unsaturated and saturated esters) are readily biodegradable, however the wide variety of products available under the HEES classification can perform quite differently; this is primarily dependent on whether an unsaturated or saturated base composition has been chosen. Unfortunately, this aspect causes some confusion when considering which fluid to use designated under this classification. Saturated ester is the higher performing product.
- HEPR fluids (polyalphaolefins) are inherently biodegradable and have good hydrolytic stability. They are more rapidly biodegradable than mineral oils, but significantly less biodegradable than most ester and vegetable based fluids.
- HEPG (polyglycols) may be water-based but cannot be mixed with other hydraulic fluids and are often incompatible with some seal materials. These fluids have traditionally been used in subsea control systems.

Typical Available Data	**Standard Mineral Oil**	**HETG (Rapeseed Type Oil)**	**Unsaturated HEES**	**Saturated HEES**
	ISO VG 32			
Density @ 15°C (g/ml)	0.880	0.922	0.929	0.918
Flash point (°C)	204	255	198	240
Pour point (°C)	-29	-33	-36	-58
Viscosity @ 40°C (mm^2/s)	32.0	34.0	35.0	31.8
Viscosity @ 100°C (mm^2/s)	5.4	8.0	8.1	5.8
TAN (mg KOH/g)	0.96	0.40	0.60	0.70
Viscosity index	103-140	210-250	175-215	140 -150
Iodine value	-	80-120	40-80	<10
Optimum temp range (°C)	<80	<60	<80	>80

Table 1 – Typical data for the three readily biodegradable fluids in comparison with mineral oil

3.1 Fluid Chemistry

The iodine number is a value for the amount of unsaturated organic esters in grease and oil. The value is determined by adding iodine to the grease or oil until the ability of the grease or oil to chemically bind is stopped; essentially, the iodine number is how many grams of iodine were added per 100 grams of substance tested. A higher iodine number defines the level of unsaturated esters in the liquid, which could combine with other substances to produce a chemical bond. In unfavourable circumstances such as contaminated oil, high temperature or extended drain intervals, high levels of unsaturated organic esters, as found in rapeseed-based oils, will react and bind with other substances, e.g. oxygen, and can cause gumming and residues.

[1] HE stands for 'hydraulic environmental' as defined by ISO 15380 – HEPG is polyglycols; HETG is triglycerides; HEPR is polyalphaolefins; and HEES is synthetic esters. From IDR International Dredging Review Jan 2012.

4 Fluid Performance Parameters

4.1 Fluid Visual Effect/Surface Sheen

Mineral oils are known to produce a persistent and long lasting 'sheen' when spilt on to the surface of water. This is commonly known as the 'rainbow effect' or Newton's Rings. Some biodegradable fluids differ in this aspect; saturated ester type fluids leave no visual effect on the surface and any initial film is rapidly dispersed.

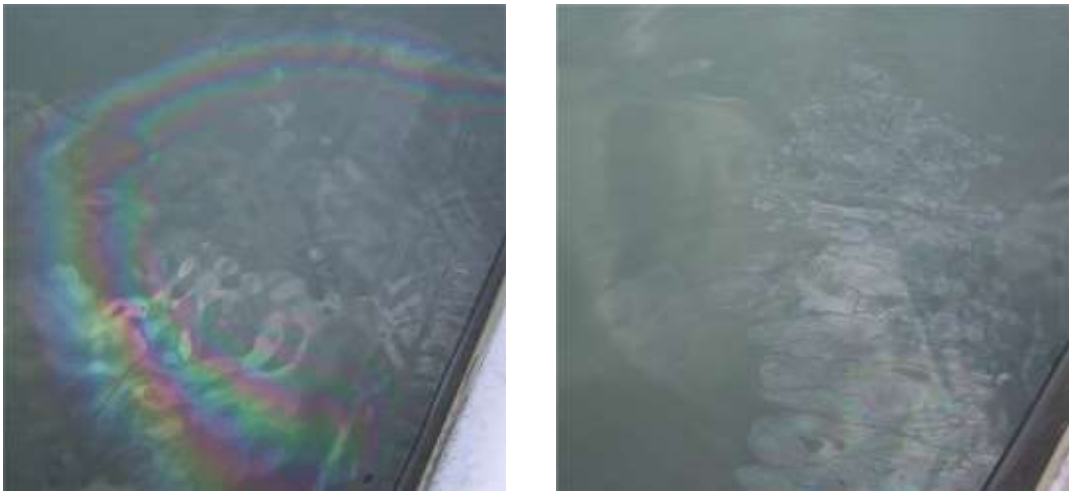

Figure 1 – Water surface effects of mineral oil (left) and saturated esters (right)

4.2 Oxidation Resistance

Oxidation, or ageing, of a fluid is caused when a fluid reacts with oxygen. The result is extreme thickening and gumming of the fluid, producing varnish deposits which can lead to catastrophic system failures. Chemically speaking, vegetable-based and unsaturated ester based fluids have many open bonds that react with oxygen when exposed to thermal load causing the fluid to age more rapidly. Saturated esters, on the other hand, have significantly fewer open bonds so they do not oxidise rapidly and will last much longer when subjected to high temperatures.

4.3 Anti-Corrosion

Most fluids will have adequate anti-corrosion properties although the chemical structure may differ across the various types available. Water intrusion should be kept to minimum.

4.4 Insulation Properties of Hydraulic Fluids

The insulating or dielectric quality of hydraulic fluids varies. The better the insulator hydraulic oil is, the higher will be the applied voltage at which it might break down. Some biodegradable hydraulic fluids offer excellent voltage breakdown characteristics compared to conventional hydraulic fluids, thus providing the operator with the opportunity to rationalise on one product (where a combination of mineral oil and transformer oil may have been used before).

Figures 2 and 3 provide an example of the voltage breakdown characteristics of fluids taken and tested directly from the source container. Control measures should be introduced to keep water contamination to a minimum.

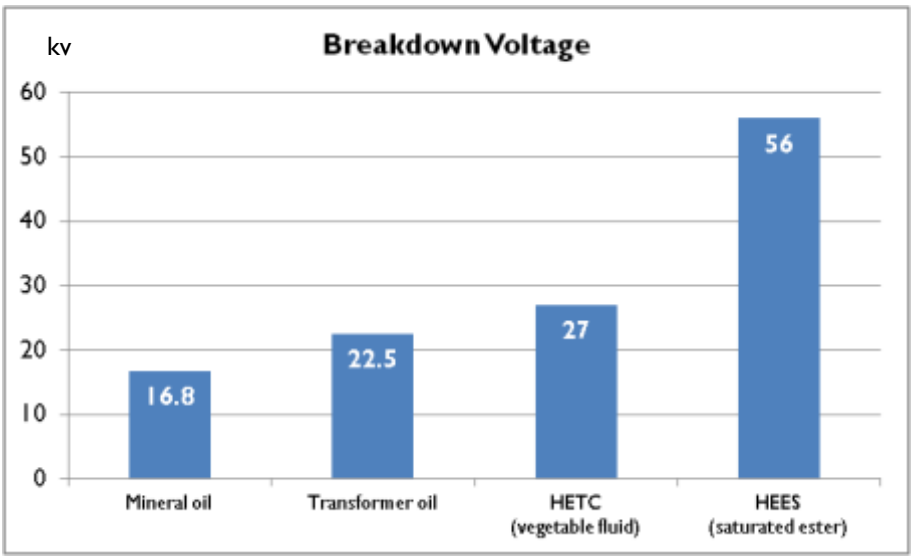

Figure 2 – Breakdown voltages of different hydraulic fluids

Figure 3 highlights a fluid kept below 500ppm water contamination with the dielectric strength remaining intact.

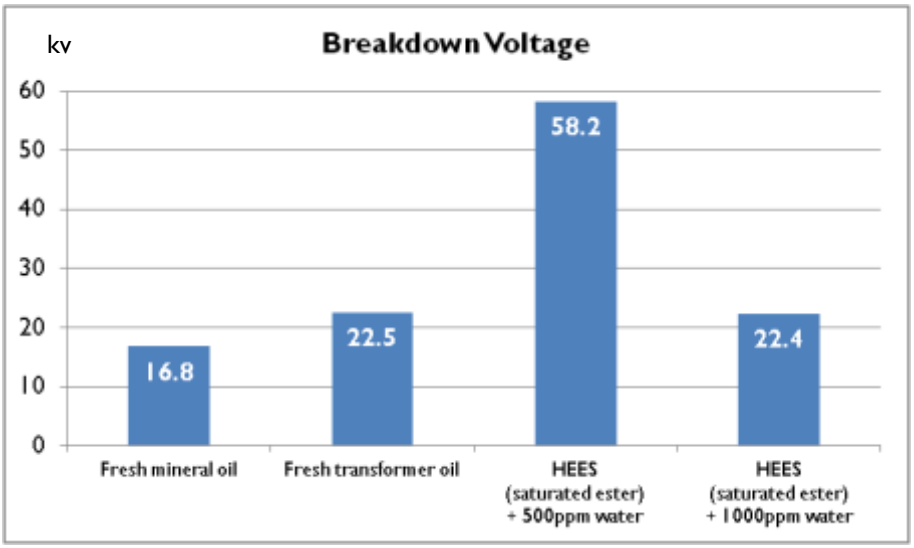

Figure 3 – Breakdown voltage of hydraulic fluids kept below 500ppm with the dielectric strength remaining intact

4.5 Seal Compatibility

The compatibility of a seal with a fluid is mainly influenced by the chemistry of that particular fluid; parameters such as viscosity or product formulations will almost certainly differ between lubricant manufacturers. Therefore it is essential to obtain detailed seal compatibility data from the supplier for the fluid being considered for use; an example of a typical data format is shown in Table 2.

Characteristics of Test	Units	Requirements				Test Method or Standard
Viscosity Grade		**22**	**32**	**46**	**68**	**ISO 3448**
Elastomer compatibility after 1,000 h at given test temperature						ISO 6072
NBR 1	°C	60	80	80	80	
HNBR	°C	60	80	80	80	
FPM AC 6	°C	60	80	80	80	
AU	°C	60	80	80	80	
Change in Shore-A-hardness, max.	grade	±10	±10	±10	±10	
Change in volume, max.	%	-3 to +10	-3 to +10	-3 to +10	-3 to +10	
Change in elongation, max.	%	30	30	30	30	
Change in tensile strength, max.	%	30	30	30	30	

Table 2 – Showing detailed seal compatibility data

4.6 Relationship of Viscosity, Temperature and Pressure

Consideration should be given to the relationship between the viscosity, temperature and pressure of a fluid. Viscosity index (VI) is an arbitrary measure for the change of viscosity with temperature. Some hydraulic oil formulations make use of VI improvers which can shear when in use, whereas other oils already have inherently high VI characteristics in the base fluid. Knowledge of the chemistry involved is important in order to ensure the correct choice of fluid.

Most fluids will thicken as the pressure exerted on them is increased. Figure 4 gives an indication of typical changes of viscosity with pressure. More detailed information should be obtained from the supplier of the product considered for use.

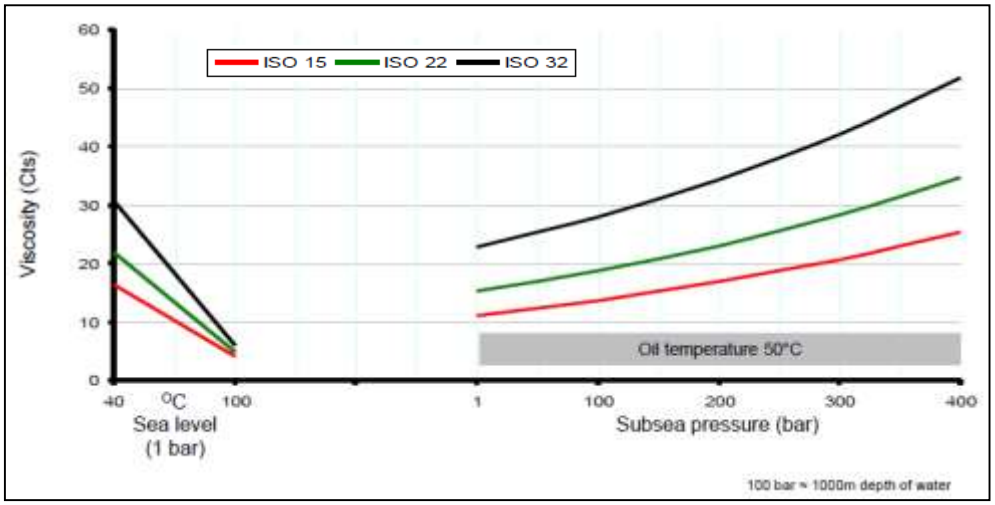

Figure 4 – Relationship of viscosity, temperature and pressure

4.7 Density

The densities of all the listed types of biofluid are slightly higher (denser) than mineral oil; however the variation in density is not considered significant.

5 Biodegradability/Ecotox

Fluids that are defined as 'readily biodegradable' should exhibit a minimum biodegradability of 60% over 28 days. Some fluids list their biodegradability against similar test methods such as CEC-L-33-A93; however this is only an indication of primary degradation. Further explanation of the various test methods for biodegradability and toxicity is included below. Essentially, products meeting OECD 301B are the preferred choice in ROV applications, but other standards may apply in different areas of the world.

5.1 Historical Synopsis

1982 – CEC-L-33-T82

This was the first tentative (T) attempt to clarify the parameters for biodegradable oils. The Austrian, German and Swiss authorities initiated the test to evaluate the bacterial biodegradation of two-stroke engine oils. This test was conducted over 21 days at ambient temperature only and checked for primary degradation.

1993 – CEC-L-33-A93

This superseded CEC-L-33-T82 to become the approved (A) test, but still only tests for primary degradation. The test was conducted using two fluid mixtures in parallel:

a) Oil sample under test without poisonous chemical which should show bacterial bio decomposition;

b) Oil sample under test with poisonous chemical, which should show no bio decomposition. This procedure detects volatile substances such as solvents, by killing the bacteria.

1996 – OECD 301B

This is the current test method and is accepted by the 'majority' of international environment agencies. The test is completed over 28 days and evaluates primary and final degradation.

5.2 Relevant Key Freshwater Ecotox Tests for Base Fluid Components

Testing	Test Norm	Remarks
Biodegradability	OECD 301B	Ultimate degradation, min. 60% in 28 days
Partition co-efficient	OECD Guideline 117	Solubility in water vs. in octanol
Aquatic toxicity	OECD 201 OECD 202 OECD 203 OECD 209	Algae, growth inhibition test Daphnia, acute immobilisation test Fish, acute toxicity test Toxicity on micro-organisms from activated sludge of waste water treatment plants
Toxicity to terrestrial non-mammalian species	OECD 207	Earthworm, acute toxicity test
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

Table 3 – Relevant key freshwater ecotox tests for base fluid component

5.3 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

Table 4 – Relevant key saltwater ecotox tests for base oils and additive

6 Water Intrusion

6.1 Hygroscopic Properties of Fluids

The water content of an oil is largely influenced by temperature, relative humidity and chemical composition of the oil itself. Any oil can take in and dissolve water to a certain extent. When a fluid is mixed with small amounts of water, about 100ppm (0.01%), the fluid's appearance will not change. It will appear to be transparent because water is dissolved at a molecular level, and even over time the oil and water will not separate. There is also a correlation between viscosity, temperature and relative humidity, and the saturation point of a fluid. The higher the temperature and relative humidity, the higher the saturation point and level of dissolved water in a fluid. Typically, the concentration of water varies from 300 to 400ppm for mineral oils and 800 to 1000ppm for HEES type fluids. The main consideration is the saturation point of a fluid; once water absorption has exceeded this level, contamination is a problem whichever type of fluid is in use. Water contamination above the level of saturation will defeat the lubricating properties of the oil and can also introduce contaminants such as salt.

6.2 Hydrolysis

The use of synthetic ester fluids was found to be impractical for hydraulic oil because of the affinity with water of such compounds. Synthetic ester type fluids are formed by condensing, or combining, an acid with an alcohol, a process called 'esterification'; hydrolysis is the reverse of the esterification process and is sometimes highlighted as a potential problem when in use. However, certain conditions need to prevail for hydrolysis to occur. A significant amount of water contamination combined with elevated temperatures (90-950°C) are required before a high quality saturated ester based fluid will begin to react; it is very likely that the hydraulic system will begin to experience problems due to water intrusion before hydrolysis occurs. The oil change period for mineral oil can be partly determined by the total acid number (TAN) value 2.0mg KOH/g whereas some ester based ECLs will reach a TAN value of 5.0mg KOH/g before a change is required.

6.3 Filtration

It is essential that sufficient control measures are adopted to control any potential water intrusion. The use of subsea filtration units are widely used and recommended. One particular version used widely

in the ROV industry can be found at www.env-technologies.com/cardev-oilfiltration-sduh350uw.asp – others may be available/suitable.

7 Manufacturers

Manufacturers of hydraulic equipment such as pumps, motors and cylinders often only offer limited test data relating to ESHFs in conjunction with their products, as most of the manufacturers' test work is conducted with the use of mineral oil. As a consequence manufacturers may offer only very limited warranty conditions when using an ESHF. Some pump manufacturers with a reasonable level of interest in the ROV industry, such as Bosch Rexroth[2] and Sauer Danfoss[3], can provide charts highlighting their experience with such fluids by indicating the level of confidence numerically.

8 Regulatory Requirements – OSPAR Compliance

In some areas of the world there are no regulatory requirements relating to the use of fluids that are either intentionally or unintentionally discharged into the sea. However there are areas of operation now subject to regulations and guidelines relating to the use of certain hazardous offshore chemicals. The North East Atlantic is one such area where there are applicable regulations. Operating companies are now being asked to be Oslo and Paris Commissions (OSPAR) compliant in UK North Sea and Norwegian waters.

- OSPAR is the mechanism by which 15 governments, together with the European Community, co-operate to protect the marine environment of the North-East Atlantic.
- The Offshore Chemical Notification Scheme (OCNS) manages chemical use and discharge by the UK and Netherlands offshore petroleum industries.
- A Harmonised Offshore Chemical Notification Form (HOCNF) is completed by the fluid manufacturer and submitted for evaluation with the relevant authority.
- The UK Centre for Environment, Fisheries & Aquaculture Science (CEFAS) evaluates data submitted for each chemical component of a fluid on the HOCNF and issues a rating from E to A; E being the best available. It will also determine whether there are any alternative components to the formulation and if so issue a 'substitution warning'. Operators are then encouraged to find a suitable replacement if the fluid they are using has received a substitution warning. The fluids are evaluated every three years and a new coding is issued alongside a CEFAS template. CEFAS also administers fluids for the State Supervision of Mines (SODM) in the Dutch sector of the North Sea.
- The Norwegian Climate and Pollution Agency (KLIF) requests that the HOCNF is completed and submitted for listing on the NEMS database where restricted personnel are allowed to access the product information and issue a colour banding. A Green colour banding is the best available, however a Yellow is the desirable banding for ESHF fluids.
- The UK Department of Energy and Climate Change (DECC) liaises with CEFAS for the issuing of operating licences.
- The Ministry of Economic Affairs (MEA) in the Netherlands liaises with SODM for the issuing of licences.
- The Norwegian Petroleum Directorate (NPD) liaises with KLIF for the issuing of licences.

[2] HEPG and HEES Hydraulic Fluids – (Document: RE 90221-01/03.10) (Document: RE 90221/05.10)
[3] Experience with Biodegradable Hydraulic Fluids – (Document: 520L0465 • Rev AE • Jan 2007)

People refer to OSPAR compliance with differing terminology; to some it is 'CEFAS registration' and to others it could be 'Meeting the HOCNF' or 'is this fluid in accordance with DECC'. Whatever the terminology, we are all talking about the same subject. If you require an OSPAR compliant fluid, they can be found in listed databases from the following links:

- www.ospar.org/
- www.cefas.defra.gov.uk/industry-information/offshore-chemical-notification-scheme.aspx
- www.klif.no/english/

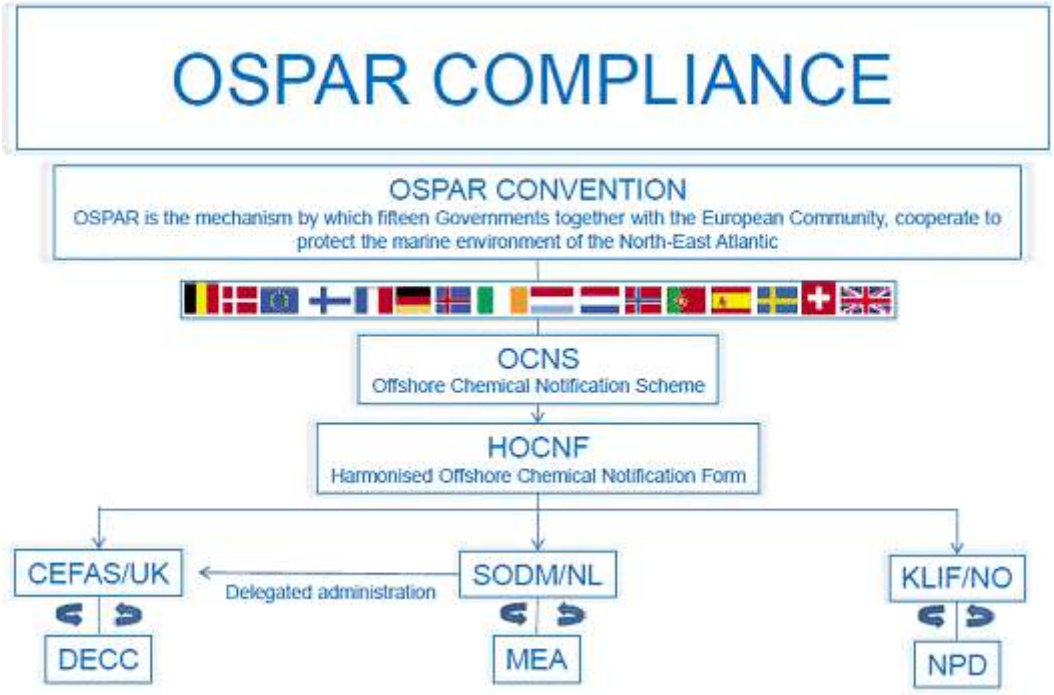

Figure 5 – Overview of the OSPAR hierarchy

9 Spill/Discharge – US Coastal Waters 1

The following pages offer a small insight into the regulations in regard to oil spill or discharges as they pertain to waters controlled by the federal or state governments of the United States of America. There are of course local regulations for practically every coastal country and IMCA will incorporate additional information as it becomes available through the awareness as highlighted by this guideline.

USA reporting requirements: The requirement for reporting oil spills stems from the Discharge of Oil Regulation, known as the 'sheen rule'. Under this regulation, oil spill reporting does not depend on the specific amount of oil spilled, but on the presence of a visible sheen created by the spilled oil. Reporting an oil discharge may also be required under the Spill Prevention, Control and Countermeasure (SPCC) Rule. For more information on US reporting of oil discharges, refer to the information on the website at www.epa.gov/oem/content/spcc/index.htm

10 Fluid Types

The ROV industry has been considering the use of ESHF for some years but there have been some drawbacks, e.g. the lack of equipment manufacturer test data and warranty, and the perceived high cost of ESHF fluids. Some ROV contractors, notionally the larger companies who have the ability to conduct their own evaluation tests with their chosen equipment and fluids, now have the experience of using ESHF fluids in ROV applications with some success. The types of fluid available are many and varied, it is therefore essential to evaluate the criteria of a particular ESHF before use. Table 5 highlights the various properties of the typical fluids available.

Typical Available Data	HETG	HEES (Unsaturated)	HEES (Saturated)	HEPR	HEPG
Flowability at low temp.	-	+/-	++	+	++
Oxidation stability	-,#	+/-	++	+/-	++
Evaporation loss	+	+	++	-	++
Water separation	-	+/-	++	+	Water soluble ##
Anti-rust protection	++	++	++	++	-
Miscibility with mineral oils	Yes* after clarification	Yes* after clarification	Yes* after clarification	Yes* after clarification	No
Compatibility with seals	+	+	+	+	+
Hydrolytic stability	-	+/-	+/-	+	++
Price	+	+/-	+/-	+/-	+
Storage times	-	+	++	+/-	+

++ = Very Good
+ = Good
+/- = Average
- = Poor
= Can cause sticking
= Water content increases corrosion, cavitation
* = Mixtures should be avoided, they are not advantageous

Table 5 – Properties of typical fluids

11 Do's and Don'ts

- Do ensure that adequate measures are utilised to prevent water intrusion.
- Do make sure you have sufficient information relating to any specific fluid.
- Do not assume all ESHFs are the same even if they are classified under the HEES category.
- Do not mix ESHFs.

12 Conclusion

The need to consider environmental impacts from oil spillage is a requirement affecting the whole of the offshore industry. The ROV community seeks to play its part in mitigating the consequences of inadvertent oil spillages from ROV systems. Selection of environmentally 'friendly' hydraulic oil for use in ROVs is an obvious but challenging option for ROV contractors. Understanding which oils are both suitable for ROV systems and at the same time possess qualities which have a biodegradability is not straightforward. This document is designed to provide basic information on the correct selection of hydraulic oil for ROV systems.

US Coastal Waters Information 1:
Oil Discharge Reporting Requirements: How to Report to the National Response Center and EPA

Reporting a hazardous substance release or oil spill takes only a few minutes. To report a release or spill, contact the federal government's centralized reporting center, the National Response Center (NRC) at 1-800-424-8802 (www.nrc.uscg.mil/index.htm). The NRC is staffed 24 hours a day by US Coast Guard personnel, who will ask you to provide as much information about the incident as possible. If possible, you should be ready to report the following:

- Your name, location, organization, and telephone number;
- Name and address of the party responsible for the incident;
- Date and time of the incident;
- Location of the incident;
- Source and cause of the release or spill;
- Types of material(s) released or spilled;
- Quantity of materials released or spilled;
- Medium (e.g. land, water) affected by release or spill;
- Danger or threat posed by the release or spill;
- Number and types of injuries or fatalities (if any);
- Weather conditions at the incident location;
- Name of the carrier or vessel, the railcar/truck number, or other identifying information;
- Whether an evacuation has occurred;
- Other agencies notified or about to be notified;
- Any other information that may help emergency personnel respond to the incident.

If reporting directly to the NRC is not possible, reports also can be made to the EPA regional office (www.epa.gov/epahome/regions.htm) or the US Coast Guard Marine Safety Office in the area where the incident occurred. In general, EPA should be contacted if the incident involves a release to inland areas or inland waters, and the US Coast Guard should be contacted for releases to coastal waters, the Great Lakes, ports and harbors, or the Mississippi River. The EPA or US Coast Guard will relay release and spill reports to the NRC promptly.

Report Processing

All reports of hazardous substance releases and oil spills made to the federal government are maintained by the NRC. The NRC records and maintains all reports in a computer database called the USCG's Emergency Response Notification System, which is available to the public (www.nrc.uscg.mil/foia.html). The NRC relays the release information to an EPA or US Coast Guard On-Scene Co-ordinator (OSC), depending on the location of the incident. In every area of the country, OSCs are on-call and ready to respond to an oil or hazardous substance release at any time of the day. After receiving a report of an oil or hazardous substance release, the federal OSC evaluates the situation and, if the OSC decides that a federal emergency response action is necessary, the National Response System will be activated. Otherwise, the OSC will monitor the cleanup activities of the responsible party and the local and state governments, and will assist in the cleanup as warranted. See also www.epa.gov/oem/content/reporting/report.htm

US Coastal Waters Information 2:
Reporting Requirements: Oil Spills and Hazardous Substance Releases

The top priority of EPA's Emergency Management program is to eliminate any danger to the public and the environment posed by hazardous substance releases and oil spills. Any person or organization responsible for a release or spill is required to notify the federal government when the amount reaches a federally-determined limit. Separate reporting requirements exist for:

- oil spills (www2.epa.gov/emergency-response/reporting-requirements-oil-spills-and-hazardous-substance-releases#oil spills);
- hazardous substance releases (www2.epa.gov/emergency-response/reporting-requirements-oil-spills-and-hazardous-substance-releases#hazardous substances).

States also may have separate reporting requirements. However, anybody who discovers a hazardous substance release or oil spill is encouraged to contact the federal government, regardless of whether they are the responsible party. All it takes is a single telephone call to the National Response Center at (800) 424-8802 (www.epa.gov/oem/content/partners/nrsnrc.htm).

For more information see www.epa.gov/oem/content/reporting/index.htm#info.

Oil Spills

EPA has established requirements to report spills to navigable waters or adjoining shorelines. EPA has determined that discharges of oil in quantities that may be harmful to public health or the environment include those that:

- violate applicable water quality standards;
- cause a film or 'sheen' upon, or discoloration of the surface of the water or adjoining shorelines; or
- cause a sludge or emulsion to be deposited beneath the surface of the water or upon adjoining shorelines.

Any person in charge of vessels or facilities that discharge oil in such quantities is required to report the spill to the federal government. EPA provides several exemptions from the oil spill reporting requirements (www.epa.gov/oem/content/reporting/oilexem.htm).

The requirement for reporting oil spills stems from the Discharge of Oil Regulation, known as the 'sheen rule' (www.epa.gov/oem/content/lawsregs/sheenovr.htm). Under this regulation, oil spill reporting does not depend on the specific amount of oil spilled, but on the presence of a visible sheen created by the spilled oil. Reporting an oil discharge may also be required under the Spill Prevention, Control and Countermeasure (SPCC) Rule (www.epa.gov/oem/content/spcc/index.htm). For more information on reporting oil discharges, please see Oil Discharge Reporting Requirements: How to Report to the National Response Center and EPA (PDF) (www.epa.gov/oem/docs/oil/spcc/SPCCFactsheetSpillReportingDec06.pdf) (also available in Appendix 4).

Hazardous Substances

For releases of hazardous substances, the federal government has established a Superfund Reportable Quantities (RQs) website (www.epa.gov/oem/content/reporting/rqover.htm). If a hazardous substance is released to the environment in an amount that equals or exceeds its RQ, the release must be reported to federal authorities, unless certain reporting exemptions (www.epa.gov/oem/content/reporting/hazexems.htm) for hazardous substance releases also apply.

Under the Emergency Planning and Community Right-to-Know Act (EPCRA) of 1986 (www.epa.gov/oem/content/epcra/index.htm), the federal government has designated several hundred substances as 'extremely hazardous substances' based on their acute lethal toxicity. Under the law, releases of these extremely hazardous substances trigger reporting requirements to state and local authorities, as well as the federal authorities. The owner or operator of a facility that releases an extremely hazardous substance in an amount greater than its established RQ must follow requirements on how to report (www.epa.gov/oem/content/reporting/report.htm) to the appropriate authorities (in many cases, the State Emergency Response Commission (SERC) and the Local Emergency Planning Committee (LEPC)) for the location where the incident occurs.

For More Information

For more information on reporting hazardous substance releases, read our Frequent Questions pages (www.epa.gov/oem/content/reporting/faq_main.htm).

Additional information on EPA's Emergency Management Program for Hazardous Substances is available (www.epa.gov/oem/content/hazsubs/index.htm).

US Coastal Waters Information 3:
Online Reporting Tool Template

:: NRC ON-LINE REPORTING TOOL ::

The National Response Center has deployed an On-Line Reporting Tool. This tool provides users of the internet the ability to easily submit incident reports to the NRC. In addition, the tool will transmit an email containing the report number back to the Reporting Party. The on-line HELP feature will assist users in all facets of the tool. We invite you to utilize the NRC On-Line Reporting Tool by clicking here.

On-Line Reporting Tool

::NATIONAL RESPONSE CENTER MISSION::

The National Response Center (NRC) is the **sole** federal point of contact for reporting oil and chemical spills. If you have a spill to report, contact us via our toll-free number or check out our Web Site for additional information on reporting requirements and procedures. For those without 800 access, please contact us at 202.267.2675. The NRC operates 24 hours a day, 7 days a week, 365 days a year.

If you have specific questions relating to the mission of the NRC, we encourage you to send an **email** to the NRC Duty Officer and you will receive a reply within 24 hours. Unless otherwise specified in the U.S. Code of Federal Regulations, the NRC does not accept reports that are emailed or faxed. You can submit an online report by using the On-Line Reporting Tool located under the Services tab above.

US Coastal Waters Information 4:
Oil Discharge Reporting Requirements

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Oil Discharge Reporting Requirements

How to Report Oil Discharges to the National Response Center and EPA

If a facility or vessel discharges oil to navigable waters or adjoining shorelines, waters of the contiguous zone, or in connection with activities under the Outer Continental Shelf Lands Act or Deepwater Port Act of 1974, or which may affect natural resources under exclusive U.S. authority, the owner/operator is required to follow certain federal reporting requirements. These requirements are found in two EPA regulations – 40 CFR part 110, Discharge of Oil regulation, and 40 CFR part 112, Oil Pollution Prevention regulation. The Discharge of Oil regulation provides the framework for determining whether an oil discharge to inland and coastal waters or adjoining shorelines should be reported to the National Response Center. The Oil Pollution Prevention regulation, part of which is commonly referred to as the "SPCC rule," identifies certain types of discharges from regulated facilities that also need to be reported to EPA. Although these reporting requirements were not changed by EPA's recent modifications of the SPCC rule, this Fact Sheet will help facilities with the Reportable Discharge History criterion associated with the qualified facility option and the oil-filled operational equipment option offered in the recent SPCC modifications.

Who is subject to the Discharge of Oil regulation?

Any person in charge of a vessel or of an onshore or offshore facility is subject to the reporting requirements of the Discharge of Oil regulation if it discharges a harmful quantity of oil to U.S. navigable waters, adjoining shorelines, or the contiguous zone, or in connection with activities under the Outer Continental Shelf Lands Act or Deepwater Port Act of 1974, or which may affect natural resources under exclusive U.S. authority.

What is a "harmful quantity" of discharged oil?

A harmful quantity is any quantity of discharged oil that violates state water quality standards, causes a film or sheen on the water's surface, or leaves sludge or emulsion beneath the surface. For this reason, the Discharge of Oil regulation is commonly known as the "sheen" rule. Note that a floating sheen alone is not the only quantity that triggers the reporting requirements (e.g., sludge or emulsion deposited below the surface of the water may also be reportable).

Under this regulation, reporting oil discharges does not depend on the specific amount of oil discharged, but instead can be triggered by the presence of a visible sheen created by the discharged oil or the other criteria described above.

To whom do I report an oil discharge?

A facility should report discharges to the National Response Center (NRC) at 1-800-424-8802 or 1-202-426-2675. The NRC is the federal government's centralized reporting center, which is staffed 24 hours per day by U.S. Coast Guard personnel.

If reporting directly to NRC is not practicable, reports also can be made to the EPA regional office or the U.S. Coast Guard Marine Safety Office (MSO) in the area where the incident occurred.

When must I report to NRC?

Any person in charge of a vessel or an onshore or offshore facility must notify NRC immediately after he or she has knowledge of the discharge.

What information do I need to report?

NRC will ask a caller to provide as much information about the incident as possible including:

- Name, organization, and telephone number
- Name and address of the party responsible for the incident
- Date and time of the incident
- Location of the incident
- Source and cause of the discharge
- Types of material(s) discharged
- Quantity of materials discharged
- Danger or threat posed by the discharge

- Number and types of injuries (if any)
- Weather conditions at the incident location
- Other information to help emergency personnel respond to the incident

How are reports to NRC handled?

NRC relays information to an EPA or U.S. Coast Guard On Scene Coordinator (OSC), depending on the location of the incident. After receiving a report, the OSC evaluates the situation and decides if federal emergency response action is necessary.

If I report a discharge to NRC, do I also report to EPA?

If a facility is regulated under the SPCC rule and has a reportable discharge according to EPA regulations (see below), it must be reported to both NRC and EPA.

What are the oil discharge reporting requirements in the SPCC rule?

Any facility owner/operator who is subject to the SPCC rule must comply with the reporting requirements found in §112.4.

A discharge must be reported to the EPA Regional Administrator (RA) when there is a discharge of:

- More than 1,000 U.S. gallons of oil in a single discharge to navigable waters or adjoining shorelines
- More than 42 U.S. gallons of oil in each of two discharges to navigable waters or adjoining shorelines occurring within any twelve-month period

When determining the applicability of this SPCC reporting requirement, the gallon amount(s) specified (either 1,000 or 42) refers to the amount of oil that actually reaches navigable waters or adjoining shorelines, not the total amount of oil spilled.

What do I need to submit to EPA?

The owner/operator must provide the following:

- Name and location of the facility
- Owner/operator name
- Maximum storage/handling capacity of the facility and normal daily throughput
- Corrective actions and countermeasures taken, including descriptions of equipment repairs and replacements
- Adequate description of the facility, including maps, flow diagrams, and topographical maps, as necessary
- Cause of the discharge to navigable waters, including a failure analysis
- Failure analysis of the system where the discharge occurred
- Additional preventive measures taken or planned to take to minimize discharge reoccurrence
- Other information the RA may reasonably require

An owner/operator must also send a copy of this information to the agency or agencies in charge of oil pollution control activities in the state in which the facility is located.

What happens after a facility submits this information to EPA?

The EPA Regional Administrator will review the information submitted by the facility and may require a facility to submit and amend its SPCC Plan. Facilities and equipment that qualified for the new streamlined requirements may lose eligibility for those options as determined by the Regional Administrator. A state agency may also make recommendations to EPA for a facility to amend its Plan to prevent or control oil discharges.

For More Information

Review the Discharge of Oil regulation (40 CFR part 110)
http://www.gpoaccess.gov/cfr/

Review the Oil Pollution Prevention regulation (40 CFR part 112)
http://www.gpoaccess.gov/cfr/

Visit the EPA Office of Emergency Management Web site
www.epa.gov/emergencies

Call the Superfund, TRI, EPCRA, RMP, and Oil Information Center
(800) 424-9346 or (703) 412-9810
TDD (800) 553-7672 or (703) 412-3323
www.epa.gov/superfund/resources/infocenter

To Report an Oil or Chemical Discharge

Contact the National Response Center
(800) 424-8802 or (202) 267-2675
TDD (202) 267-4477
http://www.nrc.uscg.mil/index.html