NEW EPA REGULATIONS FOR ENVIRONMENTALLY ACCEPTABLE LUBRICANTS

AND THEIR EFFECT ON THE DREDGING INDUSTRY

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EnviroLogic® SafeCare®

Industry Challenges

The dredging industry faces a number of unique challenges operating heavy equipment in sensitive areas.

- **Regulatory Constraints**
- **Environmental Impact**
- **Consumer Perceptions**
- **Consequence of Spills and Leaks**
- **Equipment Uptime and Longevity**
- **Profit Pressure**

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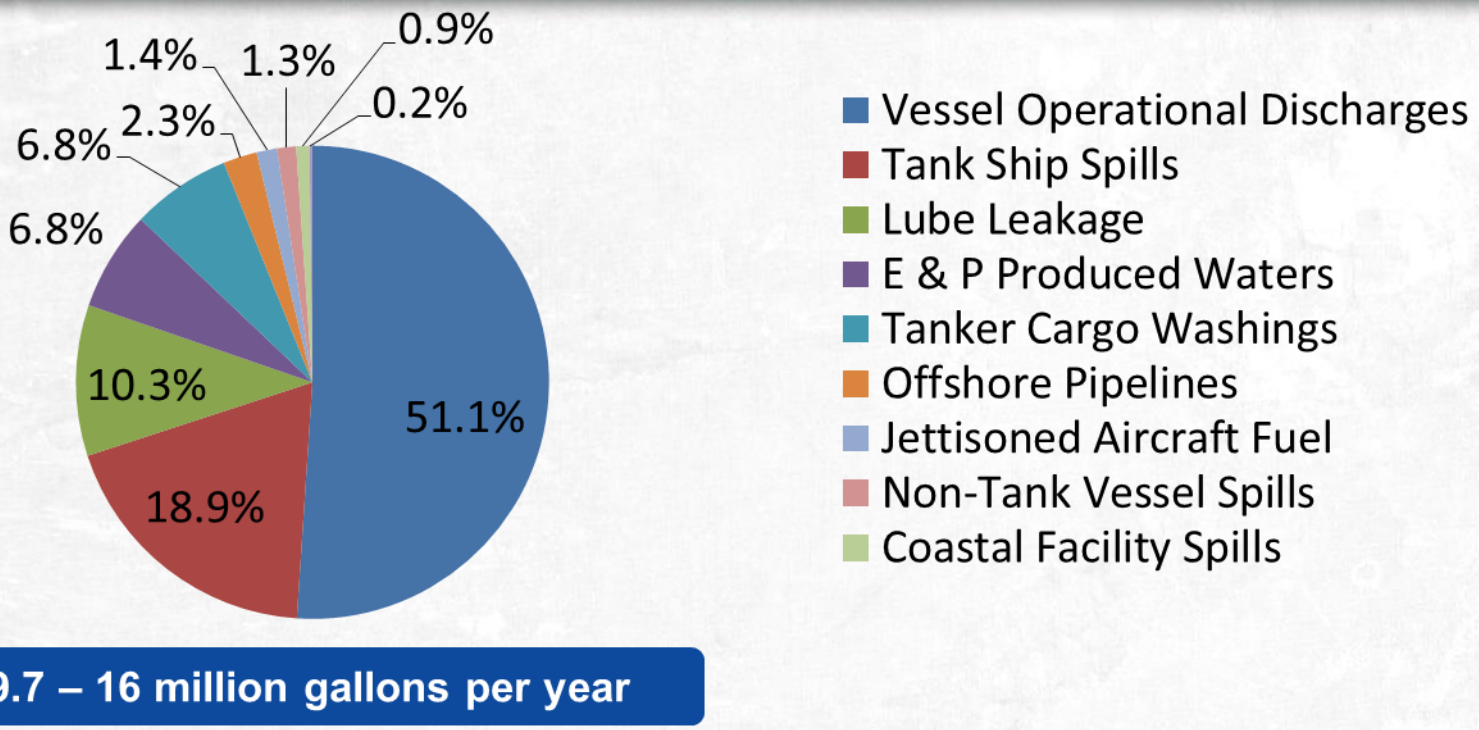
Lubricant Discharges Alone Can Represent 16 Million Gallons



9.7 – 16 million gallons per year

Annual response and damage costs: Worldwide $322 Million and US $31 Million.*

Routine, unauthorized vessel operational discharges (predominantly stern tube leakages) equate to 1.5X size of Exxon Valdez spill annually.*

*Source: EPA EAL 800-R-11-002 November 2011

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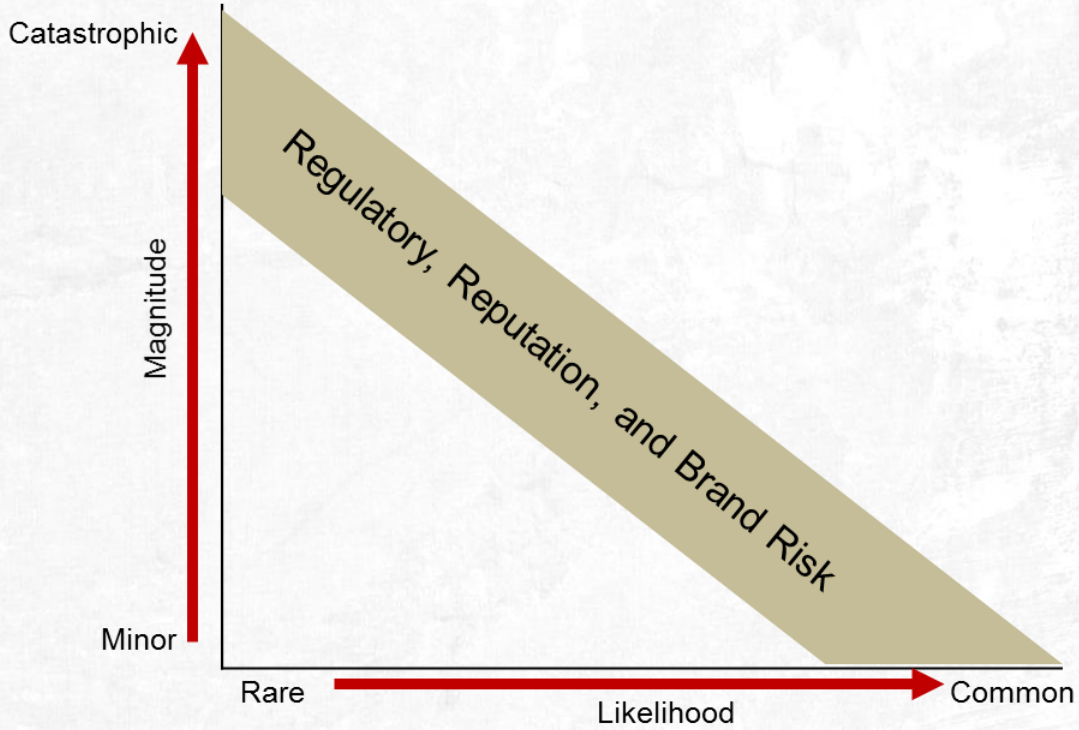
Risk Exposure comes from the Extraordinary and the Everyday


WAVES OF OIL

BLACK TIDE INTRUDES ALONG ALABAMA BEACHES

The big spills tend to get more coverage

But small spills can be even more damaging because they are more likely



How companies respond to these risk varies. Some are proactively changing their equipment and fluids; others take a wait-and-see approach.

EAL implementation for VGP & sVGP requirements

The 2013 Vessel General Permit (VGP) enacted by the United States Environmental Protection Agency (EPA) requires **all vessels to use environmentally acceptable lubricants in all oil-to-sea interfaces unless technically infeasible**.

The permit also regulates all other discharges from vessels including oil, waste, water and runoff.

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U.S. EPA
Vessel General Permit (VGP)

Applicable to:

- All commercial vessels > 79 ft
  - New builds: at time of construction
  - Existing assets: at next dry dock

- Recommended, for vessels < 79 feet through the sVGP
  - Moratorium postponed 2014 sVGP
  - Required for compliance December 2017

- Operating within three nautical miles of
  - U.S. Coastline
  - Great Lakes
  - Inland Waterways

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What systems are considered oil-to-sea interfaces?

- Z-drives
- Anchor Chain, Wire Rope
- Submersible Deck Equipment
- CPP and Thrusters
- Thruster Bearings
- **Mechanical Equipment Subject to Immersion (includes dredges)**
- Others: Oil lubricated Stern Tubes, Rudder bearings & Steering systems, Stabilizers

EPA also strongly encourages the use of environmentally acceptable lubricants high risk top-side equipment

Any component with potential to leak lubricants is included.

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When?

Important Dates:

12 Dec 2013 – Deadline for submitting Notice of Intent (NOI)

19 Dec 2013 – Effective Date of 2013 VGP> All current VGPs expire

19 March 2013 – Deadline to submit individual permit application

28 February 2015 – First Annual Report is due

If you have not filed – You're Late!

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Which dredging equipment is effected?

Hoppers

- Dragheads
- Cargo holds

Cutters & Portables

- Cutterheads
- Ladder pumps

Mechanical Equipment

- Excavators
- Cranes

Cargo Barges

Unmanned Barges

Workboats

Wire rope & winch systems that compliment as well

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Deck Washdown and Runoff and Above Water Line Cleaning

The 2013 VGP revision also requires any above water line hull cleaning or deck wash downs resulting in discharge to be conducted with “minimally toxic, phosphate free and biodegradable” cleaners and detergents as defined in the permit.

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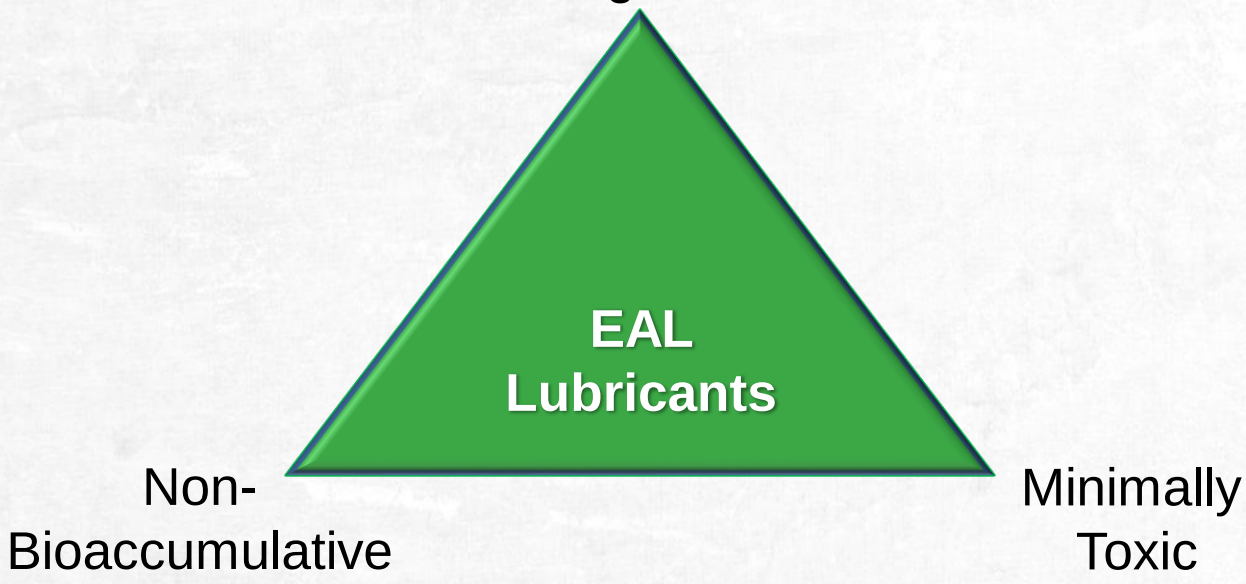
US EPA
Vessel General Permit 2013

How does the EPA define EALs?



Independent testing certification or 5 EU labeling programs are accepted by EPA. PDS, MSDS should clearly state.

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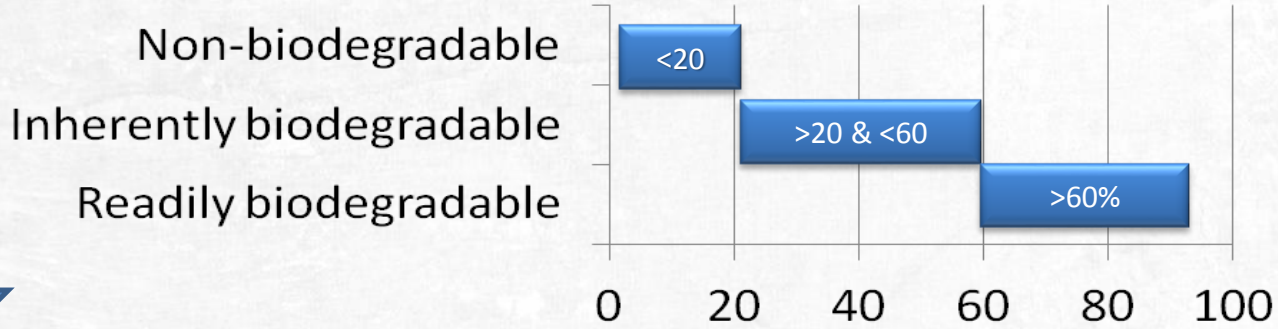
Biodegradation: Commonly Misused Term

- **Not all solutions are the same**
  - Biodegradation according to ASTM definition



"environmentally safe"

"friendly"

VGP compliant must degrade 60%+ <28 days

Aquatic Toxicity

- U.S. Fish and Wildlife Classification
  - Used to categorize by Exposure, Lethal Limits 50 values

Toxicity Classifications	
Relative Toxicity	**Aquatic EL50 or LL50 (mg/L)**
Super Toxic	< 0.01
Extremely Toxic	0.01 - 0.1
Highly Toxic	0.1 - 1.0
Moderately Toxic	1.0 - 10
Slightly Toxic	10 - 100
Practically Non-Toxic	100 - 1000
Relatively Harmless	> 1000

EALs must be practically non-toxic or relatively harmless

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Four Classes of EALs Recognized By VGP & sVGP

ISO 6743/4

- Hydraulic Environmental Triglycerides (HETG)
- Hydraulic Environmental Polyalkylene Glycols (HEPG)
- Hydraulic Environmental Synthetic Esters (HEES)
- Hydraulic Environmental PAO (polyalphaolefins) and related products (HEPR)

Particular application factors affect EAL selection.

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Not All EALs are the Same

Hydraulic Environmental Oil	HETG	HEPG	HEES	HEPR
Durability / Life Expectancy	●	●	●	●
Viscosity Index / Frictional Characteristics	●	●	●	●
Oxidative Stability	●	●	●	●
Hydrolytic Stability	●	●	●	●
Seal Compatibility	●	●	●	●
Temperature Range	●	●	●	●
Mineral Oil Compatibility	●	●	●	●

Understanding the requirements and limitations of the application allow us to recommend the best EAL. For example, while we offer HETG fluids for land applications, we more often recommend HEPR for marine applications.

TRUTH: Particular application factors affect EAL selection

What Does Technically Infeasibility Mean?

- No OEM approved EALs for a specific use
- EALs not available in ports in which vessels call
- Next dry dock has not yet occurred

Approved EALs are available in almost all cases.

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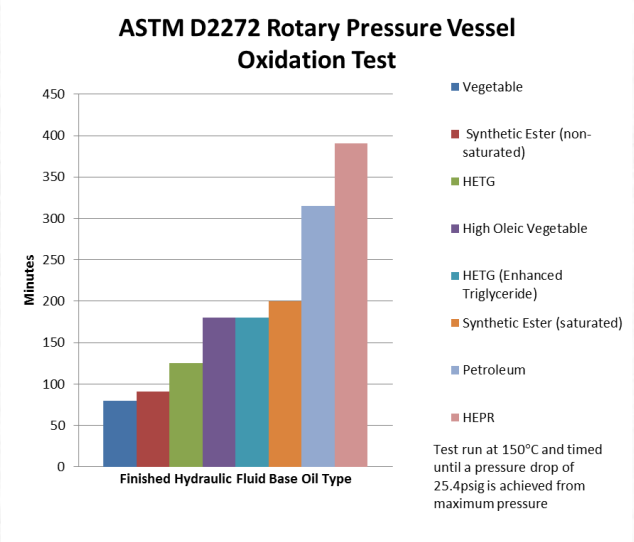
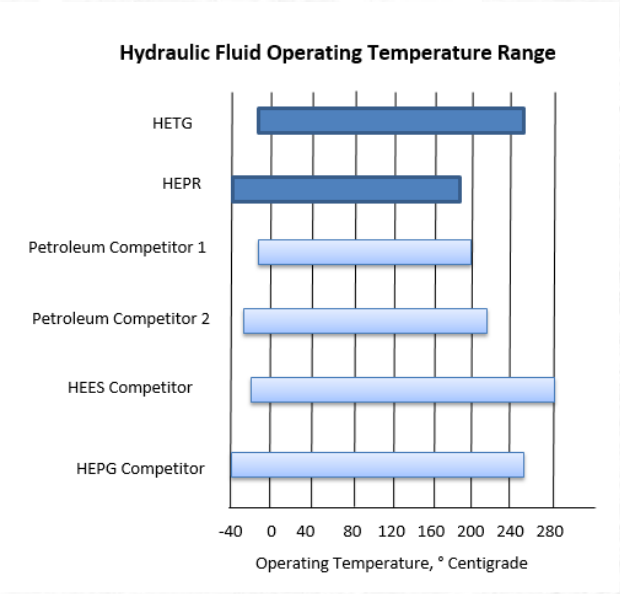
EALs are Technically Infeasible Performance and Testing

- Improved Formulations
  - Specifically designed for marine and land equipment
  - Extensive testing, both in use and specification
- Improved Compatibility
  - Components
  - Contamination
- Improved Application
  - The right product for the right application
- OEM Approved
  - Years of field proven performance





TRUTH: There is little risk with the right fluids

EALs are compatible with hydraulic seals

HYDRAULIC FLUIDS AND SEAL MATERIAL COMPATIBILITY

	Rubbers				Thermoplastics and Elastomers
	NBR, HNBR		FKM		PA, PF, PM, PEEK, PTFE
	Normal Temperature	High Temperature	Normal Temperature	High Temperature	All Temperatures
	≤60°C (≤140°F)	≤100°C (≤212°F)	≤60°C (≤140°F)	≤100°C (≤212°F)	
Hydraulic Fluid Type					
HETG (Triglycerides, rapeseed oil)	A/B	A/B	A	A	A
HEES (Synthetic esters)	A/B	A/B	A	A	A
HEPG (Polyalkylene glycols)	A	A/B	A/B	C/D	A
HEPR (Polyalphaolefins)	A/B	A/B	A	A	A

Excellent Good Limited Not Recommended

SKF Group 2012, PUB SE/P1 12393/1 EN - April 2013 ASTM D471 (Volume Change) and ASTM D2240 (Durometer Hardness)

With limited exceptions, EALs are compatible with most seals

Viable Alternatives Can Reduce Cost

Environmentally Acceptable Lubricants (EAL)

Don't	Do
• Eliminate the spill occurrence • Eliminate the need to report • Eliminate the need to clean up	• Perform equal to or better than petroleum lubricants • Mitigate the discharge's environmental impact • Improve public relations • Improve productivity, which leads to improved profitability

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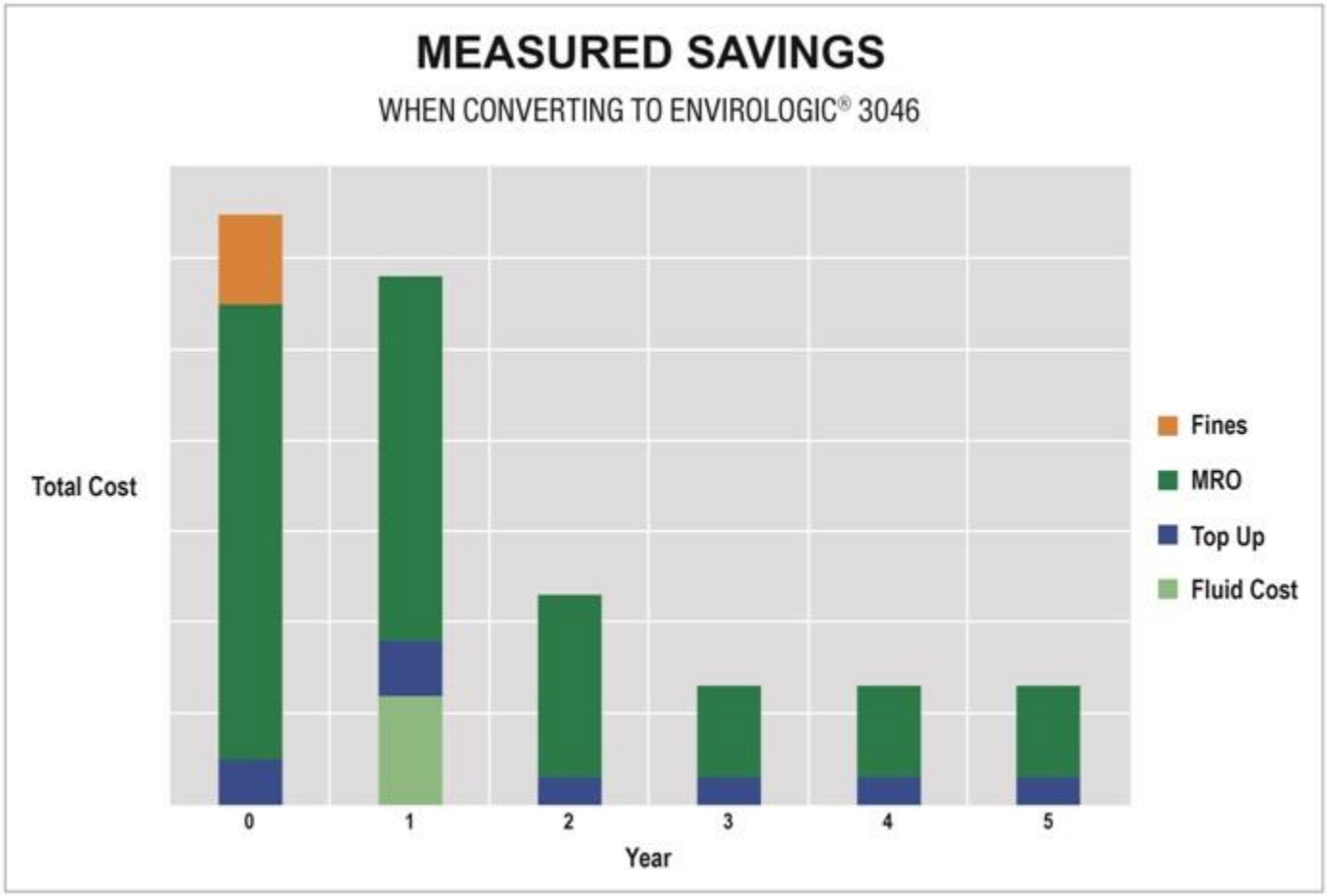
Measured Savings



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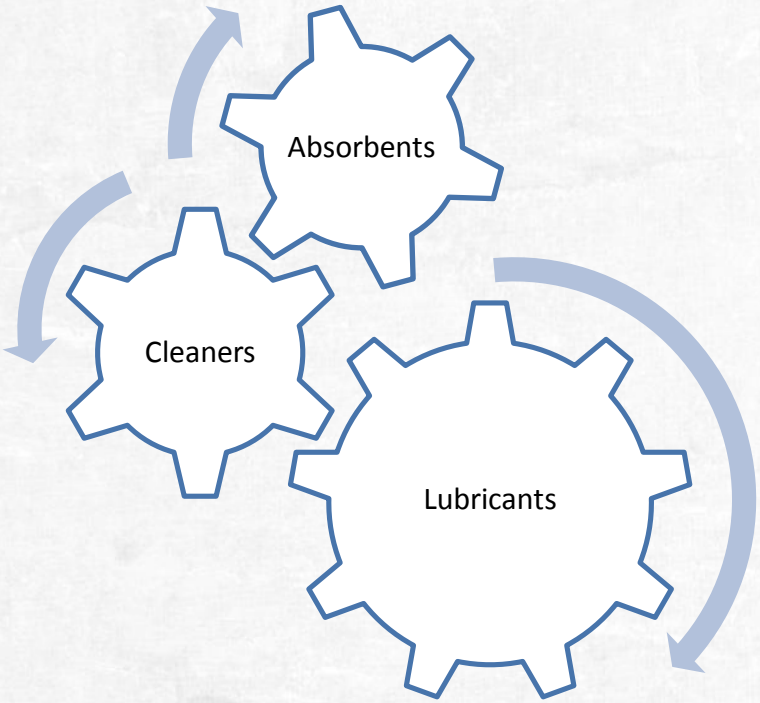
EA Solutions Work Together

Because spills are not the only exposure



Cleaners, Solvents & Absorbents

- Equal or superior performance
- Safer for employees to use
- Safer for the environment
- Contain no phosphates or alkylphenols
- Contain no harmful solvents
- Highly efficient absorbents that can be re-used

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The Path Forward

1. Understand current EPA regulations for EALs apply to >79 ft dredgers and are coming to portable dredgers soon
2. Investigate the benefits & performance of all EAL technologies
3. Decide which EAL manufacturer works best
4. Make the change to EALs in “oil-to-sea” interfaces

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Conclusion

1. The dredging industry is under constant scrutiny by the EPA, Coast Guard, Army Corps, local government, and general public to protect the environment.
2. Spills, leaks, and discharges from petroleum are costly with fines, downtime, and cleanup
3. Environmentally Acceptable Lubricants and Cleaners are viable alternatives offering both safety and performance benefits that minimize the risk

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Thank you

Questions?

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Products you need
for problems you don't.™

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