BioBlend White Paper: August 2015

Total Cost of Ownership

Abstract

Lubricant users are directly responsible for their actions … or lack thereof … to include the decision to use or not to use conventional petroleum or synthetic lubricants. The fact is *'every'* lubricant selection decision you make directly impacts your organizations *Total Cost of Ownership (TCO).* For example, in order to mitigate the costs associated with conventional petroleum or synthetic oil spills; many businesses are using, or considering selecting bio-lubes which have proven to deliver a significantly higher degree of cost and risk mitigation. In short they're safer technologies that protect users against cleanup costs, site remediation costs, downtime costs and potential fines … to say nothing about the associated potential damage to your company's brand and name. Thanks to ever- increasing governmental scrutiny and oversight, people and communities at large know your company has options when it comes to the lubricants they select to protect their equipment investment. BioBlend offers your organization a unique opportunity to better manage your TCO.

While replacing all the traditional petroleum and/or synthetic lubes your currently using with bio-lubes may not currently be feasible, there is a signifcant increase in the use of bio-fluids in many different applications and across ever-broadening market sectors. While care must be given in selecting the right product for each specific application, in reality many bio-lube technologies are in their 6th, 7th, or 8th generation of refinement and development. Every day it becomes easier and easier to select properly formulated bio-lubes that meet your application performance requirements, and that reduce your TCO. BioBlend technologies are formulated to ensure they meet the same performance standards and demands as the conventional petroleum and synthetic fluids they are slected to replace.

When you think of oil spills you have to accept that it's not a matter of ***'if'*** you'll have an oil spill … it's ***'when'*** it will happen. Spills typically occur for reasons beyond your control … but regulatory agencies really don't care. A spill is a spill and the damage has been done. After the spill, it's all about clean-up, remediation and taking action to mitigate your exposure. This all costs time, money and energy. Will your organization have taken steps to mitigate the costs and risks associated with inadvertent lube spills by having deployed sustainable, renewable bio-lube technologies in the equipment used in your operations? This white paper addresses TCO and will definitively demonstrate that you won't find another lubricant that offers a lower TCO than BioBlend technologies.

Total Cost of Ownership

The TCO Formula:

TCO = Performance + Reliability + Environmental + Risk Mitigation + Brand Impact (PR) + Price

Performance

Job one for all businesses is to keep their equipment operating at the lowest total cost. Operational uptime cannot be jeopardized. Proper lubricant selection is critical; with many businesses staying on familiar turf using conventional petroleum or synthetic lubes because it's not generally recognized that properly engineered bio- lubes offer 10 distinct performance advantages vs. conventional petroleum and synthetic lubricants:

- ✓ Naturally High Viscosity Index
- ✓ Superior Lubricity Performance
- ✓ Very High Flash Points
- ✓ Superior Cleansing Ability
- ✓ Powerful Metal Polarity
- ✓ Very High Dielectric Strength
- ✓ Green & Sustainable Technologies
- ✓ Lowest Total Cost of Ownership

NOTE: See the BioBlend white paper: '***BBWP-Dispelling Common Misconceptions Associated with Bio-Lubes.v2.pdf'*** for more details on these 10 distinctive performance advantages, as well as other relevant bio-lube insights.

Relevant insights and conclusions include:

(1) When using BioBlend technologies, there will NOT be a performance deficiency versus using the conventional petroleum or synthetic lubricants they replace.
   i. BioBlend bio-canola products offer equal or better performance than conventional petroleum lubes.
   ii. BioBlend bio-synthetic products offer equal or better performance than conventional synthetic lubes.

(2) BioBlend technologies will NOT biodegrade in your equipment … it takes water and/or soil microbes, sunlight, heat, water, UV radiation, etc. to start the biodegradation process … which occurs in the environment – not your equipment.
   i. Conventional petroleum products are ***'Inherently Biodegradable'*** *(15-35% biodegraded in 28 days using EPA-recognized test protocols).*
   ii. Bio-lubes from BioBlend are ***'Readily Biodegradable'*** *(>60% biodegraded in 28 days using EPA-recognized test protocols)*.
   iii. Both technology offerings will biodegrade outside the equipment and if introduced directly into the environment. The difference is the environmental impact. Readily biodegradable technologies simply biodegrade quicker if inadvertently spilled.

(3) BioBlend technologies are compatible with the conventional petroleum and synthetic products they replace. The only exception is PAG synthetics *(polyalkyleneglycol)* which are incompatible with conventional petroleum fluids, conventional synthetic fluids and bio-lube fluids. In fact they are even often incompatible with other PAG's from other manufacturers.

(4) BioBlend technologies are compatible with all conventional seals, seal materials and hoses if the equipment is so equipped.

(5) There are no special requirements to convert from conventional petroleum or synthetic lubricants. While ideally the systems using conventional petroleum or synthetic fluids should be drained and flushed to optimize the environmental benefits of BioBlend technologies, in the real world it's more common to simply drain, refill and go. Again – no special preparations are required to convert to BioBlend technologies other than to drain as much of the previous fluid from the system as possible … just like you currently do when changing lubricant types.

NOTE: See the BioBlend white paper: '***BBWP-Guidelines to Converting to BioBlend Lubricants.v2.pdf***' for more details on the relative ease of converting to, and using, BioBlend product technologies.

Reliability

Know this … **you are NOT a guinea pig!** When considering the use of bio-lubes, businesses need to know there are no issues related to bio-lube compatibility with conventional lubes, nor incompatibilities with conventional seals, seal materials and hoses. It is also crucial that fluid and grease component and system manufacturers are able to ensure that the products they provide are useful and compatible with all fluids and account for the end user's requirements. With almost two decades of offering bio-lubes on a global scale, BioBlend can consistently produce products that replace conventional petroleum and/or synthetic lubes. While a complete system flush, drain and cleaning is desired to maximize the environmental benefits, in reality a simple drain and fill is all that's necessary

Environmental

Equipment operators may prefer biodegradable hydraulic fluids, and fluid manufacturers like BioBlend are meeting these demands by offering bio-lube solutions based on measureable environmental performance parameters. It's often incorrectly assumed that bio-lubes will biodegrade in the equipment thereby significantly shortening their useful service life. This simply isn't true. Have you ever heard of a petroleum lube biodegrading in a piece of equipment? (NO). Again, most petroleum lubes are *'inherently biodegradable'*, meaning 15-35% biodegraded in 28

days per OECD testing. They don't biodegrade in equipment because it takes soil and/or water microbial activity, oxygen, and heat and or UV radiation to catalyze the biodegradation process. BioBlend technologies will NOT biodegrade in your equipment anymore than a petroleum lube would. PERIOD.

At BioBlend we substantiate the environmental attributes of our offering by offering technologies that meet current EPA definitions and recognized test protocols to be classified as:

- ✓ ***Readily Biodegradable*** … meaning >60% biodegraded in 28 days when introduced into the environment
- ✓ ***Minimally Toxic*** …meaning the environmental or toxic impact on soil & water microorganisms … and higher life forms … after entering the environment AND while the lube biodegrades within that environment
- ✓ ***Non-Bioaccumulative*** … meaning whether or not toxic substances will accumulate in soil/water microorganisms, and up through the food chain *(if a lubricant is toxic to soil & water microbes while it's biodegrading, that same level of toxicity can have an equally devastating impact moving up through the food chain, including on humans)*

The environmental impact BioBlend technologies have on the planet, and their abilities to reduce carbon footprints, is very low and non-intrusive. At BioBlend environmental lubricant stewardship is driven by parameters as noted by the EPA definition of *Environmentally Acceptable Lubricants (EAL's)* as per the *EPA's 2013 Vessel General Permit (VGP).* The table below offers lubricant users guidelines for selecting lubricants to use in sensitive marine environments. Since oil spills on land have an impact on streams, rivers, lakes and sea *(i.e. the water table)* users should consider using lubricants that meet these EPA requirements to be classified as Environmentally Acceptable Lubricants.

> **NOTE:** C*laims that a lubricant is environmentally-friendly …-aware … -conscious …-responsible simply have no formal EPA basis.*

EPA's 2013 VGP Criteria for Lubricant Classification as an EAL

As defined in Appendix A of the 2013 VGP, there are three criteria for a product to be classified as an Environmentally Acceptable Lubricant (EAL)

EAL Criteria	***EPA Recognized Testing*** *(or calculations)*
Readily Biodegradable	- OECD 301 A-F, 306, and 310 - ASTM 5864 - ASTM D-7373 - OCSPP Harmonized Guideline 835.3110 - ISO 14593:1999
Minimally Toxic	- OECD 201, 202, and 203 for acute toxicity *testing* *(ISO/DIS 10253 for algae, ISO TC147/SC5/W62 for crustacean, and OSPAR 2005 for fish, may be substituted)* - OECD 210 and 211 for chronic toxicity testing
Not Bioaccumulative *(criteria can be based on calculated values as established under testing)*	- The partition coefficient in the marine environment is log KOW <3 or >7 using test methods OECD 117 and 107 - Molecular mass > 800 Daltons - Molecular diameter >1.5 nanometer - BCF or BAF is <100 L/kg using OECD 305, OCSPP 850.1710 or OCSPP 850.1730 - Field-measured BAF - Polymer with MW fraction below 1,000 g/mol is <1%

> **NOTE:** For more details ask for BioBlend's white Paper: ***'BBWP-BioBlend VGP-EAL Compliance Position Paper.v2.pdf'***

Risk Mitigation

As demands on lubricant systems increase, the likelihood of accidental release of fluids into the environment increases. Increased operating temperatures, pressures and working cycles shorten the life of equipment components. With lubricant spills the reality is it's not a matter of **"if"** it will happen ... it's **"when".** The single best approach to protecting your equipment, your operation and the environment is to deploy and use readily biodegradable lubricants with minimal toxicity that are not bioaccumulative. They provide a significantly safer alternative to petroleum and synthetic lubricants, especially in environmentally-sensitive areas. The continued use of conventional petroleum and synthetic lubricants will simply NOT mitigate your organizations risks, nor protect users against cleanup costs, downtime costs, remediation costs and potential fines. The only means to achieve true risk mitigation to your organization is to use bio-lubes that meet current EPA definitions for environmental stewardship.

When it comes to oil spills BioBlend always recommends that federal and state guidelines regarding lube spill reporting be adhered to. That said, it's important to once again differentiate conventional petroleum and synthetic lubes from BioBlend bio-lubes.

- ✓ Were you aware the federal government does not classify bio-lubricants as used oil, even after use?
- ✓ Were you aware that regarding used oil spills many states operate via the federal guidelines?

The governing environmental agency in your state may assess lower penalties and fines, depending on the circumstances of the spill, if the organization with the spill is using a readily biodegradable lubricant. They will consider the toxicity of the substances and their affect on the environment, so use of minimally toxic, non-bioaccumulative biolubes will reduce your company's exposure and risk factors when compared to using a conventional petroleum or synthetic lubricant.

> **NOTE:** See the BioBlend white paper: ***'BBWP-The BioBlend Oil Spill Advantage.v2.pdf'*** for insights on the federal guidelines related to oil spills, oil spill reporting and clean-up. For an example of insights on state regulatory viewpoints, ask for the: ***'Oregon DEQ_Biodegradable toxicity letter 3 26 12.pdf'.***

While some states have more stringent oil spill classification and reporting guidelines than the federal government, the fact is if you can demonstrate you are using lubricant technologies like BioBlend it will be like investing in risk mitigation insurance.

Brand Image / PR *(public relations)*

Beyond oil spill reporting, clean-up & remediation costs and the fines associated with even an inadvertent lube spill, there is a cost to your organizations brand and/or reputation every time you spill oil. How many years, and how much money, do you have invested in building your company's brand and reputation? What financial and/or PR impact could your next accidental oil spill have on your company's future?

Risk Mitigation Comparison … 250 gallon oil spill		
Category	**BioBlend BioFlo Hyd. Fluid**	**Conventional Petroleum Hyd. Fluid**
Base Oil	Vegetable	Petroleum
Biodegradability	Days *(Readily Biodegradable)*	Years *(Inherently Biodegradable)*
Aquatic Toxicity, LC50, ppm	>10,000	(unspecified)
Est. Initial Clean-up Cost for Spill	$1,000	$2,500
Est. Damage Liability	$0	$30,000-$40,000
Est. Remediation Costs, 6 mon.	$0	$10,000-$50,000
EST. TOTAL SPEND	**$1,000**	**$42,500-$57500** *(varies by govt.)*
Impact on Brand/Public Relations	Minimal ($0)	Substantial ($??????)

Price

Because price does matter, consider this:

- ✓ BioBlend bio-canola products sell at the same or a slightly higher per gallon price than petroleum lubes.
- ✓ BioBlend bio-synthetic products sell at the same or slightly higher per gallon price than synthetic lubes.

Certainly the currently prevailing geo-political impacts tied to the petroleum market directly impact the price one pays for finished petroleum lubricants *(synthetic pricing is much more stable).* However, at all times we are one world-crisis away from exorbitant petroleum pricing … resulting in an unmanageable and unpredictable pricing unknown that does not plague the bio-lube technologies. The intrinsic value associated with using sustainable, renewable lubricant technologies versus conventional petroleum or synthetic products is our countries greatest hedge against rapid lube commodity price explosions and variances.

Total Cost of Ownership *(TCO)*

Considering BioBlend's signifcant environmental advantages … and face the facts … there is an ever-present and costly impact tied to inadvertent lubricant spills, there is simply not a lubricant technology offering on the planet that offers a lower TCO than the minimally impactful, performance-driven BioBlend technologies. The TCO formula really puts into perspective the reality of business operating profitability … meaning astute business personnel must consider all impacts related to Total Cost of Ownership.

*TCO = **P**erformance + **R**eliability + **E**nvironmental + **R**isk Mitigation + **B**rand Impact or PR + **P**rice*

Business owners, business management, business employees please consider this one factoid… you have choices! The bio-lube BioBlend technologies have been continuously refined and updated to the point that you no longer have to accept an in-service performance deficiencies that plagued 1st generation bio-lubes. Recognize that when synthetic motor oil entered the marketplace in 1972 they weren't 'conventional. In fact they had a myriad of problems such as gelling up in automobile engines. Over time refinements and technology improvements occurred to the point that today the use of synthetics is commonplace with usage considered a conventional practice. Even OEM's that condemned synthetics years ago *(Harley Davidson and others)* have come full circle and now offer synthetic technologies with their own brand on the label.

The bio-lube technologies offered by BioBlend today have been engineered to deliver performance first … and they're readily biodegradable and minimally toxic. It's a smart business decision to mitigate the costs and risks associated with your lubricant selection decisions … because oil spills do happen … and conventional petroleum and synthetic lubricant technologies simply can't deliver.

Contact BioBlend or your BioBlend representative today for a professional discussion on how a BioBlend solution can reduce your TCO.

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