

Sustainable Biobased Demos

NASA Armstrong Flight Research Center, Edwards, California
Jun Kumazawa, Environmental Protection Specialist

NASA AFRC Hosted Biobased Demos

- Partnered with DoD STED Program
- Hosted Multiple USDA Certified Biobased Products starting 2018
- Test program supplies product
- Beta Tested Products in Real World Conditions
- Hot, Dry, Windy, & Dusty Environment of the Western Mojave Desert



Biobased Engine Oils

- 5 AFRC Owned Vehicles of Various Years/Models/Fuel Types Selected
- SDS Approved through Center Chemical Approval Process
- Positive response from mechanics involved in test protocols



BIOBLEND
High Performance BioBased Lubricants

SAFETY DATA SHEET

SECTION 1: IDENTIFICATION

Company Information:	*Emergency Contact Information:*
BioBlend Renewable Resources, LLC 2250 Arthur Ave. Elk Grove Village, IL 60007 (630) 227-1800 www.bioblend.com	(630) 227-1800 8 AM - 4 PM, Monday through Friday

Product Name	BioBlend 5W-30
Product Description	Biodegradable Engine Oil
Product Use	Product is intended for use as an automotive lubricant. Not for human or animal consumption.

SECTION 2: HAZARD(S) IDENTIFICATION

Hazard Statement	This chemical is not considered hazardous by the 2012 OSHA Hazard Communication Standard, which has been updated to align with the Globally Harmonized System of Classification and Labelling of Chemicals (GHS).
Precautionary Statements	Oil soaked materials (rags, steel wool, clothing, etc.) should be placed in a sealed metal container to prevent spontaneous combustion (fire). The product contains no substances at their given concentration, that are considered hazardous to one's health. If swallowed, immediately call a poison center or doctor/physician. Do not induce vomiting. Dispose of contents/container to location in accordance with local, state, and federal regulations.
Hazard Classification	Not Applicable
TSCA Label Text	Use in compliance with TSCA Regulation 40 CFR 720.36. The sample label and this safety data sheet contain the required health and safety information under 40 CFR 720.36.

Vehicle Year	Vehicle Make	Vehicle Model	Current Odometer Reading (miles)	Estimated Annual Mileage	Current Engine Oil and Grade	Fuel Type
1998	GMC	3500	57,836	2,900	Chevron Supreme 10W-	Gasoline
2000	Sterling	L-7500		3,300	Chevron Ursa Supreme Plus 15W-40	Diesel
2016	Jeep	Rubicon 4x4	5,589	2,400	Chevron Havoline 5W-20	Gasoline
2011	Kenworth	W-900	5,909	3,400	Chevron Ursa Supreme Plus 15W-40	Diesel
2017	Ford/LDV	Transit 350 HD	2,475	350	Chevron Havoline 5W-30	Gasoline

Biobased Engine Oils

- Bio Oil change-out at regular oil change intervals
- Periodic oil sampling & lab analysis
- Biobased Oils performed well even under hot/dusty conditions
- Featured in Center news article

Biosynthetic™ TECHNOLOGIES

Biosynthetic Technologies DOD

Location: Main > DLA CTC NASA Armstrong Flight Research Ctr

Unit ID: Jeep Rubicon 51-86

Model:

Machine Type: Engine

OK

Elevated silicon (dirt/dust) abrasives.

System Admin, 22 Feb 2018

Oil Chevron Havoline 5w20		Sample ID		2290B1 S2717
Note: oil changed Last change 9/16/17 3,458 Baseline petro oil sample for Biosynthetic 5w20.		Sampled on		13 Feb 2018
		Received on		21 Feb 2018
		h/m Total		5608
		h/m Oil		2150
		Top up (l.)		
			Warning Limits	
ASTM D6595-00 WEAR METALS	Iron	ppm	0 - 150	34
	Chrome	ppm	0 - 10	1
	Nickel	ppm		<1
	Molybdene	ppm		153
	Aluminium	ppm	0 - 20	6
	Lead	ppm	0 - 25	<1
	Copper	ppm	0 - 120	92
	Tin	ppm	0 - 10	<1
	Silver	ppm		<1
	Titanium	ppm		<1
ASTM D6595-00 CONTAMINANTS	Silicon	ppm	0 - 25	51
	Sodium	ppm	0 - 15	5
	Vanadium	ppm		<1
	Potassium	ppm		6
	Lithium	ppm		<1
ASTM D6595-00 ADDITIVES	Calcium	ppm		1209
	Magnesium	ppm		36
	Phosphorus	ppm		709
	Zinc	ppm		896
	Barium	ppm		<1
	Boron	ppm		62
MET-MEC-005	Fuel dilution	%		2
ASTM D445	Viscosity at 40°C	cSt		42
ASTM D445	Viscosity at 100°C	cSt		7.3
ASTM D2270-98	Viscosity index	°C		138
ASTM E2412	TBN	mg KOH/g	<2.00	3.43
	WaterPPM	ppm		882.7
	Oxidation By-Products	abs/mm2		12.7
	Nitration By-Products	abs/mm2		11.9
	Sulfation By-Products	abs/mm2		18.2
	Glycol	%	0.0 - 0.5	0.0
	Soot	%wt		0.0

Date 22 Feb 2018

X-Press March 2018

NASA helps test new engine oils

By Jay Levine
X-Press editor

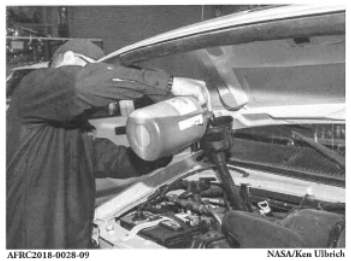
NASA is assisting with performance testing and validation of three new bio-based engine oils that developers said could lead to better gas mileage, longer oil change intervals and reduced emissions.

Four vehicles and soon five at Armstrong are using the new engine lubricant. The U.S. Department of Defense (DOD) Bio-based Motor Oil Demonstration Program focuses on these new oils that are a blend of conventional synthetic oils with 25-40 percent bio-based material, such as domestically produced soybean and canola oils and animal fat.

All three bio-based motor oils used in the demonstration have American Petroleum Institute certification for use in gasoline engines, said Andy Shaban of the U.S. Defense Logistics Agency (DLA) and a coordinator for the lubricant oil tests. Using the oil does not require engine modifications and is expected to be comparable in cost to fully synthetic petroleum engine oil, he said.

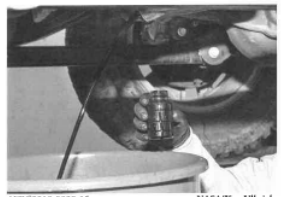
"The bio-based synthetic oils demonstration is to validate performance and to determine when, based on vehicle miles driven or idle time, the lubricant needs to be changed, Shaban explained. "The new oils will be compared to the laboratory test results of the previous oil."

Vehicles at NASA's Kennedy Space Center in Florida, Langley Research Center in Virginia, Johnson Space Center's White Sands Test Facility in New Mexico and other government agencies across the country also are part of the pilot project expected to conclude in 2019, he said. Project participants were chosen to represent the diversity of climate regions and are for use in non-tactical federal vehicles.



AFRC2018-0028-09 NASA/Ken Ulbrich

Scott Rogers pours a new bio-based synthetic engine oil into one of the four vehicles that Armstrong is using to assist in the performance testing of the new product.



AFRC2018-0028-15 NASA/Ken Ulbrich

Before new bio-based synthetic oils were added to four Armstrong vehicles, the old oil was drained and sent to a lab for analysis to compare to the new oil.

The demonstration vehicles' use of the engine lubricants and laboratory analysis will provide information that will help evaluate current oil performance and determine oil change intervals. Of the three participating oil companies, one has its oil commercially available. The other two bio-based lubricants are in pilot production and expect to have their products commercially available soon, Shaban said.

At Armstrong, as at other federal facilities, the engine oil was drained in test vehicles and analyzed at a lab to develop a baseline of comparison to the synthetic lubricant, said Jason Denman, auto shop lead at Armstrong for Kay and Associates Inc. The new oil, which has a clear, gold tint like traditional engine oils, was poured into the engines.

Every six months samples will be collected using a tube inserted in the dipstick opening to obtain a sample of about half a pint, Denman said. The oil will be analyzed for metal flakes and particulates, carbon content and breakdown of the additives that will give researchers the clues as to how long the oil will last in actual use and engine wear.

Denman is enjoying helping on the research side of the center.

"I like being part of something that could be the new standard," he said. "Anything that can help the environment and what we leave behind is a benefit."

The DOD uses 1.1 million gallons of four-cycle engine oil annually in 180,000 vehicles, Shaban said. The entire federal government, including the military services, civilian agencies and the U.S. Postal Service, maintains 633,000 vehicles.

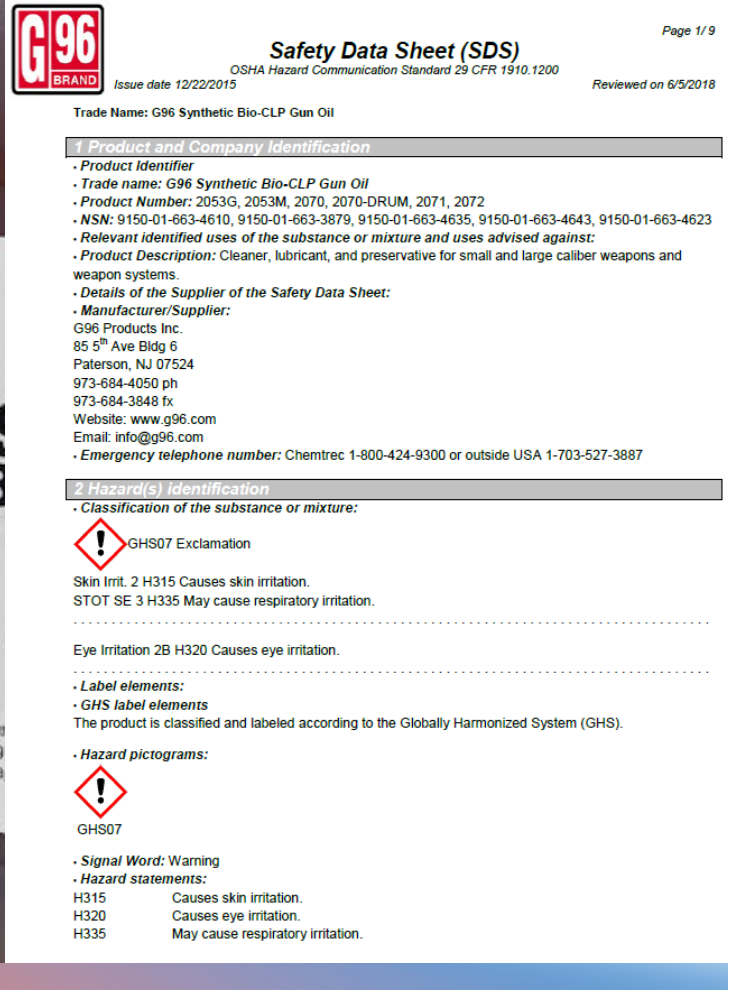
The DLA also is coordinating on the project with the Office of the Assistant Secretary of Defense for Energy, Installations and Environment in Washington, D.C., and the Air Force Research Laboratory, Advanced Power Technology Office in Ohio.



Biobased CLP Gun Oil

- AFRC had been ordering multiple petroleum solvents/oils for its Security Weapons.
- A Bio-CLP (Cleaner, Lubricant, Preservative) will reduce chemical stocks while changing over to a sustainable product.
- SDS approved by Center Chemical Management





G96 BRAND

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Safety Data Sheet (SDS)

OSHA Hazard Communication Standard 29 CFR 1910.1200

Issue date 12/22/2015 *Reviewed on 6/5/2018*

Trade Name: G96 Synthetic Bio-CLP Gun Oil

1 Product and Company Identification

- ***Product Identifier***
- ***Trade name: G96 Synthetic Bio-CLP Gun Oil***
- ***Product Number:*** 2053G, 2053M, 2070, 2070-DRUM, 2071, 2072
- ***NSN:*** 9150-01-663-4610, 9150-01-663-3879, 9150-01-663-4635, 9150-01-663-4643, 9150-01-663-4623
- ***Relevant identified uses of the substance or mixture and uses advised against:***
- ***Product Description:*** Cleaner, lubricant, and preservative for small and large caliber weapons and weapon systems.
- ***Details of the Supplier of the Safety Data Sheet:***
- ***Manufacturer/Supplier:***

G96 Products Inc.
85 5th Ave Bldg 6
Paterson, NJ 07524
973-684-4050 ph
973-684-3848 fx
Website: www.g96.com
Email: info@g96.com

- ***Emergency telephone number:*** Chemtrec 1-800-424-9300 or outside USA 1-703-527-3887

2 Hazard(s) identification

- ***Classification of the substance or mixture:***

GHS07 Exclamation

Skin Irrit. 2 H315 Causes skin irritation.
STOT SE 3 H335 May cause respiratory irritation.

Eye Irritation 2B H320 Causes eye irritation.

- ***Label elements:***
- ***GHS label elements***

The product is classified and labeled according to the Globally Harmonized System (GHS).

- ***Hazard pictograms:***

GHS07

- ***Signal Word:*** Warning
- ***Hazard statements:***

H315	Causes skin irritation.
H320	Causes eye irritation.
H335	May cause respiratory irritation.

Biobased CLP Gun Oil

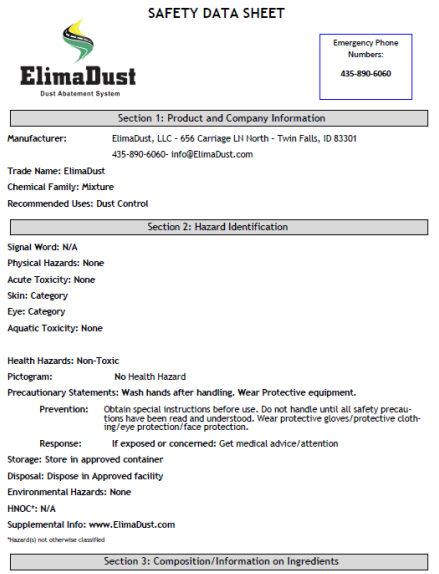
- Tested by AFRC Protective Services on Pistols, Rifles, & Shotguns
- Tested by EAFB Security Forces on Pistols, Rifles, & Machine Guns
- Feedback form filled out by users
- Outperforms traditional product
- Less product needed for cleaning/lubrication
- Almost no odors
- No special flammable storage needed





Biobased Dust Suppressant

- Test Site: AFRC Palmdale Aircraft Facility
- Approvals obtained from AFRC Environmental, AFRC Flight Ops, Los Angeles World Airports Environmental
- Sprayed next to aircraft pad with ElimaDust
- Area subjected to engine tests and run-ups
- Non-petroleum product; “Inverted Sugars”



SAFETY DATA SHEET

ElimaDust
Dust Abatement System

Emergency Phone Numbers:
435-890-6060

Section 1: Product and Company Information

Manufacturer: ElimaDust, LLC - 656 Carriage Ln North - Twin Falls, ID 83301
435-890-6060- info@ElimaDust.com

Trade Name: ElimaDust
Chemical Family: Mixture
Recommended Uses: Dust Control

Section 2: Hazard Identification

Signal Word: N/A
Physical Hazards: None
Acute Toxicity: None
Skin: Category
Eye: Category
Aquatic Toxicity: None

Health Hazards: Non-Toxic
Pictogram: No Health Hazard
Precautionary Statements: Wash hands after handling. Wear Protective equipment.
Prevention: Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves/protective clothing/eye protection/face protection.
Response: If exposed or concerned: Get medical advice/attention
Storage: Store in approved container
Disposal: Dispose in Approved facility
Environmental Hazards: None
HNOC*: N/A
Supplemental Info: www.ElimaDust.com
*Hazard(s) not otherwise classified

Section 3: Composition/Information on Ingredients





Biobased Dust Suppressant

- Good performance in reducing dust
- Periodic monitoring conducted by us
- Exceeded expected efficacy; lasted more than 8 months instead of the anticipated 6
- No adverse observations of plant/animal effects







Summary

Partnering with DoD STED program was an easy way to introduce Biobased products to Center personnel

- Good communications with STED test team
- Free demo products
- Positive interactions with our Center personnel.
- Positive Environmental spotlight
- Ability to test new biobased products for Center purchase while helping with biobased test



Questions?

jun.kumazawa@nasa.gov

USDA CERTIFIED BIOBASED PRODUCT