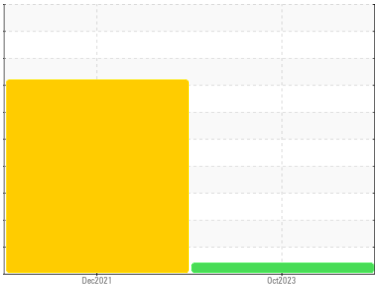
FUEL REPORT

Sample Rating Trend



VIS DEBRIS

Machine Id
DUKE RALEIGH AST-1
Component
Diesel Fuel
Fluid
No.2 DIESEL FUEL (ULTRALOW SULPHUR) (--- GAL)

DIAGNOSIS

Recommendation

We advise that you filter this fluid before use. All laboratory tests indicate that this sample meets specifications for No.2 ultra-low-sulfur diesel fuel. We were unable to perform a particle count due to a high concentration of particles present in this sample.

Corrosion

All metal levels are normal indicating no corrosion in the system.

Contaminants

Moderate concentration of visible dirt/debris present in the fuel. The water content is negligible. There is no bacteria or fungus (yeast and/or mold) present in the sample.

Fuel Condition

Sulfur value derived by ASTM D5453 method for ULSD validation. Sulfur level is acceptable for ULSD specification.

SAMPLE INFORMATION		method	limit/base	current	history1	history2
Sample Number		Client Info		**WC0869451**	WC0643834	---
Sample Date		Client Info		**10 Oct 2023**	09 Dec 2021	---
Machine Age	hrs	Client Info		**0**	0	---
Sample Status				**ABNORMAL**	SEVERE	---

PHYSICAL PROPERTIES		method	limit/base	current	history1	history2
Specific Gravity		*ASTM D1298	0.839	**0.838**	0.834	---
Fuel Color	text	*Visual Screen	Yllow	**Red**	Red	---
ASTM Color	scalar	*ASTM D1500		**L4.5**	L5.0	---
Visc @ 40°C	cSt	ASTM D445	3.0	**2.4**	2.32	---
Pensky-Martens Flash Point	°C	*PMCC Calculated	52	**58**	60	---

SULFUR CONTENT		method	limit/base	current	history1	history2
Sulfur	ppm	ASTM D5185m	10	**0**	4	---
Sulfur (UVF)	ppm	ASTM D5453		**7**	8	---

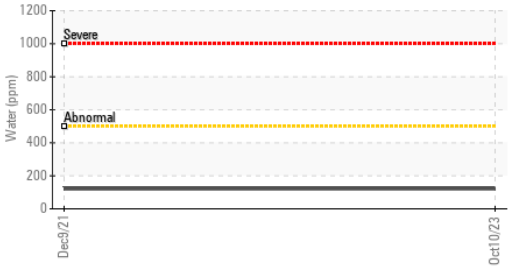
DISTILLATION		method	limit/base	current	history1	history2
Initial Boiling Point	°C	ASTM D86	165	**162**	168	---
5% Distillation Point	°C	ASTM D86		**187**	189	---
10% Distill Point	°C	ASTM D86	201	**196**	197	---
15% Distillation Point	°C	ASTM D86		**203**	203	---
20% Distill Point	°C	ASTM D86	216	**212**	210	---
30% Distill Point	°C	ASTM D86	230	**227**	224	---
40% Distill Point	°C	ASTM D86	243	**242**	238	---
50% Distill Point	°C	ASTM D86	255	**257**	252	---
60% Distill Point	°C	ASTM D86	267	**272**	268	---
70% Distill Point	°C	ASTM D86	280	**289**	285	---
80% Distill Point	°C	ASTM D86	295	**306**	305	---
85% Distillation Point	°C	ASTM D86		**316**	315	---
90% Distill Point	°C	ASTM D86	310	**327**	326	---
95% Distillation Point	°C	ASTM D86		**342**	340	---
Final Boiling Point	°C	ASTM D86	341	**349**	351	---
Distillation Residue	%	ASTM D86	3.0	**1.4**	1.4	---
Distillation Loss	%	ASTM D86	3.0	**0.9**	0.4	---

IGNITION QUALITY	method	limit/base	current	history1	history2
API Gravity	ASTM D7777	37.7	**37.4**	38.2	---
Cetane Index	ASTM D4737	<40.0	**48.4**	48.8	---

CONTAMINANTS		method	limit/base	current	history1	history2
Silicon	ppm	ASTM D5185m	<1.0	**0**	0	---
Sodium	ppm	ASTM D5185m	<0.1	**0**	0	---
Potassium	ppm	ASTM D5185m	<0.1	**<1**	<1	---
Water	%	ASTM D6304	<0.05	**0.012**	0.012	---
ppm Water	ppm	ASTM D6304	<500	**121.7**	121.3	---
% Gasoline	%	*In-House	<0.50	**0.0**	0.0	---
% Biodiesel	%	*In-House	<20.0	**3.2**	4.2	---

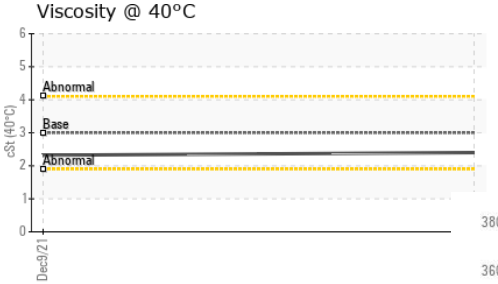
FUEL REPORT

Water (KF)



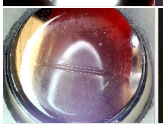
Viscosity @ 40°C

Viscosity @ 40°C



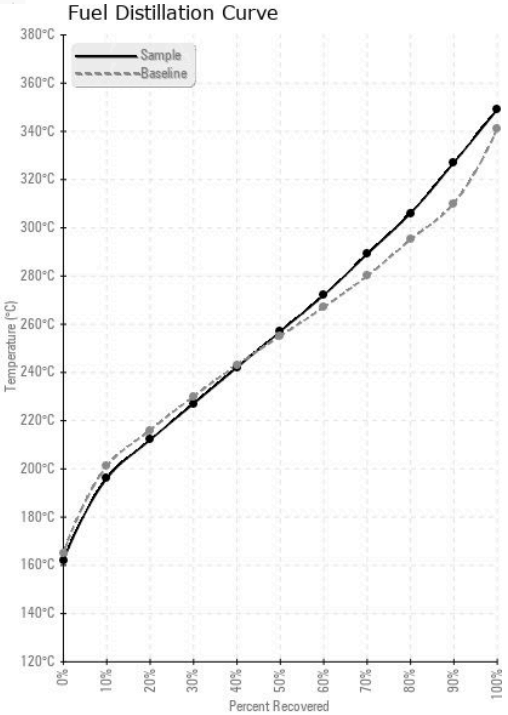
MICROBIAL		method	limit/base	current	history1	history2
Bacteria	CFU/ml	WC-Method	>=100000	**0**	0	---
Yeast	CFU/ml	WC-Method	>=100000	**0**	▲ 10	---
Mold	Colonies	WC-Method	MODER	**---**	---	---

HEAVY METALS		method	limit/base	current	history1	history2
Aluminum	ppm	ASTM D5185m	<0.1	**0**	0	---
Nickel	ppm	ASTM D5185m	<0.1	**0**	0	---
Lead	ppm	ASTM D5185m	<0.1	**0**	0	---
Vanadium	ppm	ASTM D5185m	<0.1	**0**	0	---
Iron	ppm	ASTM D5185m	<0.1	**0**	<1	---
Calcium	ppm	ASTM D5185m	<0.1	**<1**	0	---
Magnesium	ppm	ASTM D5185m	<0.1	**<1**	0	---
Phosphorus	ppm	ASTM D5185m	<0.1	**6**	5	---
Zinc	ppm	ASTM D5185m	<0.1	**0**	0	---

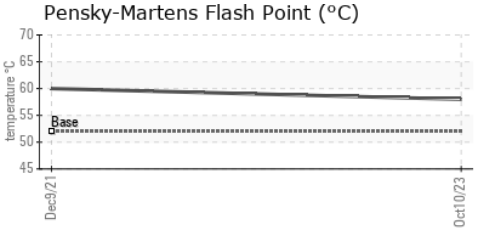
SAMPLE IMAGES	method	limit/base	current	history1	history2
Color					*no image*
Bottom					*no image*

GRAPHS

Fuel Distillation Curve



Pensky-Martens Flash Point (°C)



Certificate L2367

Laboratory : WearCheck USA - 501 Madison Ave., Cary, NC 27513
Sample No. : WC0869451 **Received** : 17 Oct 2023
Lab Number : 05981544 **Diagnosed** : 25 Oct 2023
Unique Number : 10698839 **Diagnostician** : Doug Bogart
Test Package : DF-2 (Additional Tests: Bacteria, Screen)

To discuss this sample report, contact Customer Service at 1-800-237-1369.
** - Denotes test methods that are outside of the ISO 17025 scope of accreditation.*
Statements of conformity to specifications are based on the simple acceptance decision rule (JCGM 106:2012)

VITAL FUEL SYSTEMS
1076 CLASSIC RD
APEX, NC
US 27539
Contact: JOHN MORREALE
jmorreale@vitalfuelsystems.com
T: (919)629-8180
F: (919)303-7399