EVALUATION OF A CANDIDATE OIL ADDITIVE

FINAL REPORT
SwRI® Project No. 08-15220.22

Prepared for
[Private label version of D-1280X]
[redacted]

Prepared by
Scott A. Hutzler, Senior Research Scientist
Fuels and Lubricants Technology Department
Southwest Research Institute (SwRI®)
6220 Culebra Road
San Antonio, TX 78228

April 2010

Approved by:

Steven D. Marty, P.E., Director
Fuels & Lubricants Technology Department

(This page left intentionally blank)

Table of Contents

List of Tables

1.0 Objective

The objective of this test was to evaluate an engine oil containing the [Private label version of D-1280X] per Department of Defense Policy Guidelines for the Use of Aftermarket Fuel and Lubricant Additives (dated February 2007). The evaluation included selected physical and chemical characteristics for a neat sample of oil (conforming to SAE J2362) and a sample of the same oil treated with [Private label version of D-1280X] additive.

2.0 Results

Two oil samples were evaluated in this study: a neat, 10W-30 motor oil meeting SAE J2362 (which supersedes A-A-52039B), and the same oil containing the candidate additive. The oil was acquired from a commercial source. The Oil/Additive blend was prepared as 1-oz [Private label version of D-1280X] to 1-qt oil.

The results of the analysis on each sample are provided in Table 1.

Table 1. Summary of Results

Test	Method	Unit	10W-30 Oil	Oil + Additive
Viscosity Index	**D2270**	**--**	159	152
Kinematic Viscosity @ 100°C	**D445**	**cSt**	10.95	9.68
Kinematic Viscosity @ 40°C	**D445**	**cSt**	65.55	57.77
Sulfur Content	**D2622**	**ppm**	2104	2074
API Gravity @ 60°F	**D287**	**--**	31.2	31.1
Apparent Viscosity @ -20°C	**D4684**	**mPa/s**	3200	2400
Apparent Viscosity @ -25°C	**D4684**	**mPa/s**	5800	4500
Elemental Analysis	**D4951**			
Barium		**ppm**	<5	<5
Boron		**ppm**	68	66
Calcium		**ppm**	2088	2020
Copper		**ppm**	<1	<1
Magnesium		**ppm**	43	41
Phosphorus		**ppm**	770	744
Zinc		**ppm**	902	870
Molybdenum		**ppm**	212	208
Carbon Residue	**D524_Neat**	**mass%**	0.92	0.87
Simulated Distillation	**D6352**			
Initial BP		**°C**	330.0	271.5
1% off		**°C**	341.4	272.2
2% off		**°C**	351.9	323.8
3% off		**°C**	357.7	345.6
4% off		**°C**	362.0	354.0
5% off		**°C**	365.4	359.3
6% off		**°C**	368.2	363.2
7% off		**°C**	370.8	366.5
8% off		**°C**	373.1	369.1
9% off		**°C**	375.1	371.7
10% off		**°C**	377.1	373.9

Table 1. Summary of Results

Test	Method	Unit	10W-30 Oil	Oil + Additive
11% off		**°C**	378.9	375.9
12% off		**°C**	380.6	377.9
13% off		**°C**	382.3	379.6
14% off		**°C**	384.0	381.3
15% off		**°C**	385.5	383.0
16% off		**°C**	387.1	384.6
17% off		**°C**	388.7	386.2
18% off		**°C**	390.2	387.8
19% off		**°C**	391.6	389.4
20% off		**°C**	393.0	390.9
21% off		**°C**	394.4	392.3
22% off		**°C**	395.8	393.7
23% off		**°C**	397.1	395.1
24% off		**°C**	398.5	396.5
25% off		**°C**	399.8	397.8
26% off		**°C**	401.1	399.2
27% off		**°C**	402.3	400.5
28% off		**°C**	403.5	401.8
29% off		**°C**	404.8	403.0
30% off		**°C**	406.1	404.3
31% off		**°C**	407.3	405.6
32% off		**°C**	408.5	406.8
33% off		**°C**	409.7	408.0
34% off		**°C**	410.9	409.3
35% off		**°C**	412.1	410.5
36% off		**°C**	413.3	411.7
37% off		**°C**	414.5	412.9
38% off		**°C**	415.7	414.1
39% off		**°C**	416.8	415.3
40% off		**°C**	418.0	416.5
41% off		**°C**	419.2	417.7
42% off		**°C**	420.4	418.9
43% off		**°C**	421.5	420.1
44% off		**°C**	422.7	421.3
45% off		**°C**	423.9	422.5
46% off		**°C**	425.2	423.7
47% off		**°C**	426.4	424.9
48% off		**°C**	427.5	426.2
49% off		**°C**	428.8	427.4
50% off		**°C**	430.0	428.6
51% off		**°C**	431.3	429.9
52% off		**°C**	432.6	431.2
53% off		**°C**	434.0	432.5
54% off		**°C**	435.4	433.9
55% off		**°C**	436.8	435.3
56% off		**°C**	438.1	436.7
57% off		**°C**	439.6	438.1
58% off		**°C**	441.0	439.6

Table 1. Summary of Results

Test	Method	Unit	10W-30 Oil	Oil + Additive
59% off		**°C**	442.4	441.1
60% off		**°C**	443.9	442.5
61% off		**°C**	445.4	444.0
62% off		**°C**	446.9	445.6
63% off		**°C**	448.4	447.1
64% off		**°C**	449.9	448.6
65% off		**°C**	451.3	450.2
66% off		**°C**	452.7	451.6
67% off		**°C**	454.1	453.0
68% off		**°C**	455.4	454.4
69% off		**°C**	456.8	455.8
70% off		**°C**	458.2	457.2
71% off		**°C**	459.7	458.7
72% off		**°C**	461.3	460.3
73% off		**°C**	463.0	462.0
74% off		**°C**	464.7	463.7
75% off		**°C**	466.5	465.5
76% off		**°C**	468.3	467.3
77% off		**°C**	470.1	469.1
78% off		**°C**	471.9	471.0
79% off		**°C**	473.9	473.0
80% off		**°C**	475.9	474.9
81% off		**°C**	477.9	476.9
82% off		**°C**	480.1	479.0
83% off		**°C**	482.4	481.1
84% off		**°C**	484.9	483.0
85% off		**°C**	487.6	485.5
86% off		**°C**	490.4	488.2
87% off		**°C**	493.4	491.1
88% off		**°C**	496.7	494.3
89% off		**°C**	500.0	497.6
90% off		**°C**	503.6	501.1
91% off		**°C**	507.9	504.9
92% off		**°C**	512.6	509.4
93% off		**°C**	518.6	514.2
94% off		**°C**	527.3	521.4
95% off		**°C**	541.8	531.7
96% off		**°C**	586.1	552.4
97% off		**°C**	640.0	611.3
98% off		**°C**	670.9	654.2
99% off		**°C**	705.9	685.5
Final BP		**°C**	735.2	707.1
Ash, Sulfated	**D874**	**mass%**	0.83	0.88
Flash Point	**D92**	**°C**	220	218
Pour Point	**D97**	**°C**	-36	-33
Stable Pour Point	**FTM 203C**	**°C**	-41	-41

3.0 Conclusion

This comparative evaluation included selected tests for bulk physical and chemical properties, safety and handling, and effects on performance characteristics per the DOD Policy Guidelines. The results of the testing showed no immediate signs of a negative impact on the oil properties tested. The only oil properties that appeared to show a significant change in response to the additive treatment was the Apparent Viscosity (D4684) and Kinematic Viscosity (D445). There was a clear 20-25% decrease in apparent viscosity at low temperature after treatment with the [Private label version of D-1280X]. Similarly, the decrease in viscosity at 40°/100°C was approximately 11-12%.