



X-1R Global Ltd

To: All X-1R distributors **From:** Nigel (Mac) McKenzie

Cc: **Date:** 8th June 2017

Subject: Revised extreme pressure modifier formulation

Changes in global materials regulations have necessitated a revision to the formulation of those of our products that contain an extreme pressure modifier (EP) component. These changes have been flagged a long time ago and thus were not a surprise but have resulted in our chemists at X-1R Corporation in Daytona working diligently on formulating and testing some changes to our product range to ensure that we would be able to freely transport, store and sell our product without being encumbered by the aforementioned changes. This process has also enabled us to take advantage of some materials engineering advances that will enhance the products but also allowed us to be able to adopt a lighter base oil carrier to match the trend of low viscosity motor-oils as mandated by governments and automakers alike. Currently many motor oil manufacturers are discouraging use of higher viscosity materials to be added to low viscosity oils so as not to deter fuel economy improvement targeted by low viscosity oils, this includes use of Viscosity Index Improvers which are highly viscous olefin and/or acrylate polymers. The use of lighter base oil has resulted in our product now floating on water.

The reformulated product has been extensively tested and is still in use with NASA who have welcomed the changes made by us. Just as importantly the recent tests conducted by the University of Utah on the CYSCO fleet of trucks was undertaken with the new formulation (see attachment following). Primarily our Engine Treatment is about the reduction of friction and the ability to improve the extreme pressure performance. Thus we need to be able to demonstrate that the new formulation can outperform non-additized oil but also we need to see how the new formulation performs when compared to our original formulation. It was with this in mind we carried out the two following tests (results attached)

ASTM D5707 SRV friction test: This test was carried out using fresh oil and simulated aged oil. Lower coefficient of friction indicated better friction reduction properties and that translates to better fuel economy, increased HP, lower wear-tear and smoother operation. In the attached results, you will see new engine treatment did better than old engine treatment.

As you can see (in the attached reports) in a fresh motor oil, old engine treatment resulted in coefficient of friction of 0.14 while new engine treatment had coef. of friction of 0.128. **That is an improvement of 8.5% over old engine treatment when it comes to friction reduction**

In aged motor oil, old engine treatment resulted in coefficient of friction of 0.11 while new engine treatment had coef. of friction of 0.093. **That is an improvement of 15.5% over old engine treatment when it comes to friction reduction**

Second test is Falex Pin & Vee Block test: This is for evaluating Extreme Pressure (EP) performance of motor oil. Lower is the wear (in milligrams mg) at a particular load for fixed amount of time, better will be extreme pressure performance of motor oil. In the attached results, you will see new engine treatment did better than old engine treatment.

As you will see (see attached report),

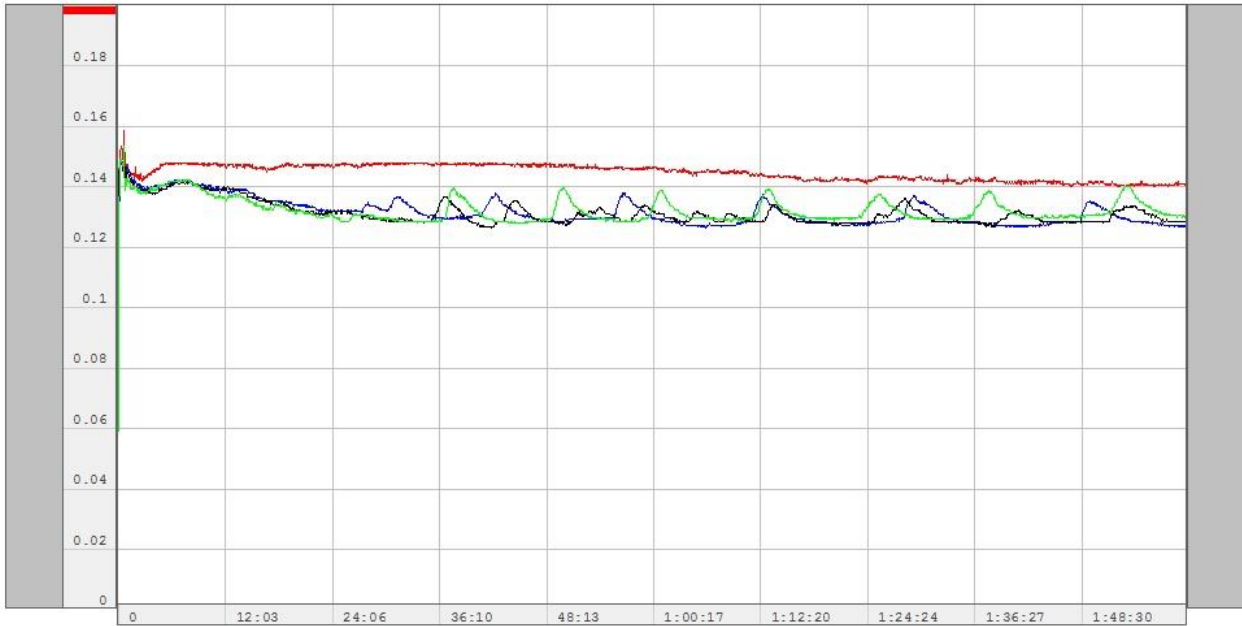
With new X-1R ET, amount of wear reduced by 26% at 750 lbs Load compared to old X-1R ET
With new X-1R ET, amount of wear reduced by 39% at 1000 lbs Load compared to old X-1R ET

The EP performance feature was our main selling point for our old engine treatment and with this test, we have outperformed old engine treatment by at least 26%. So that has to be good.

We are still conducting some long term test of the new formulation including some that will be undertaken from our old friend Dr. J Micklow and I will share these with you once they are completed. For now though you can rest assured that we are still looking for ways to ensure that we deliver class winning performance from our products.

Nigel McKenzie
June 2017

SRV Friction Test on Fresh 5W-30 Motor Oil with and without X-1R ET

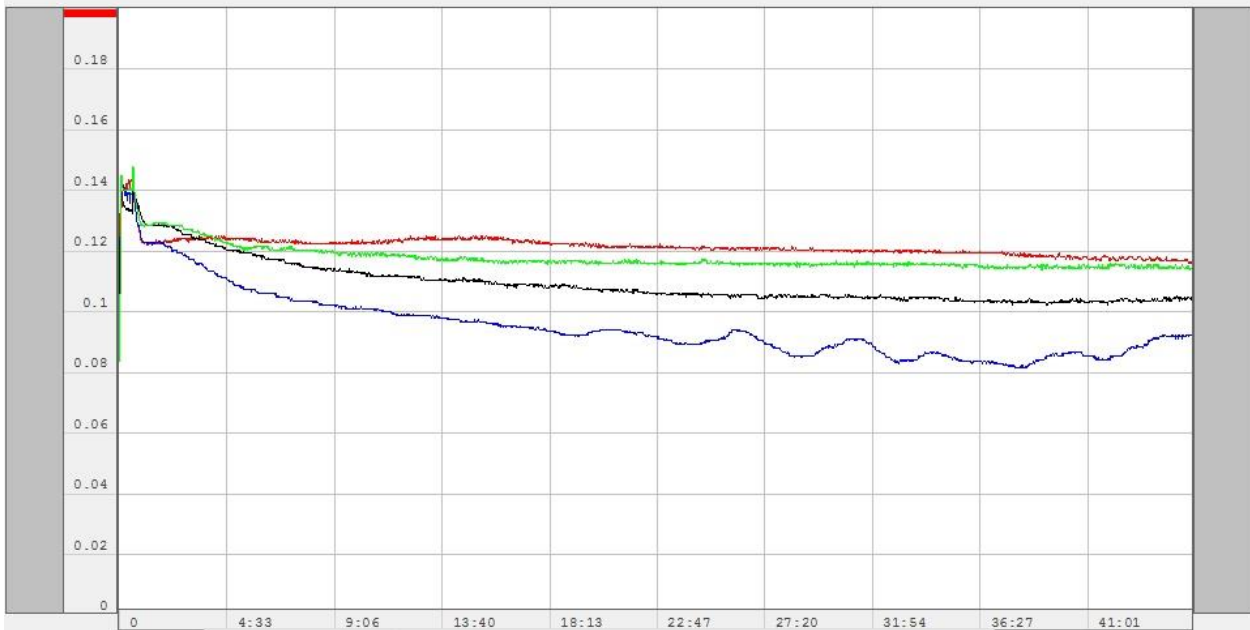


Formulation #	Test #	Disc	Volume, μm^3	Width, mm	Depth, nm	Length, mm	Final Friction
16	5909	44285	29,653	0.6535	397	1.6112	0.141
17	5910	44287	33,970	0.5187	181	1.5025	0.128
18	5911	44289	28,740	0.5158	172	1.5036	0.129
19	5912	44280	28,048	0.5290	148	1.5153	0.120

Target:
Motor Oil w/ Old X-1R ET:
Coef. of Friction: 0.14

ASTM D5707 : 200N; 50 Hz; 1.00 mm stroke; 80 C; 2h; Ball on Disc

SRV Friction Test on aged 5W-30 Motor Oil with and without X-1R ET



Formulation #	Test #	Disc	Volume, μm^3	Width, mm	Depth, nm	Length, mm	Final Friction
16 48h	5921	443T3	59,758	0.5436	348	1.9914	0.116
17 48h	5922	443T5	81,378	0.5671	422	1.9715	0.093
18 48h	5923	443T7	89,803	0.6023	372	2.0237	0.103
19 48h	5924	443T10	63,708	0.5510	298	2.0039	0.114

Target:
Motor Oil w/ Old X-1R ET:
Coef. of Friction: 0.11

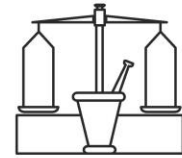
Test Conditions: 400N; 1.5mm; 50Hz; 40-120°C Temperature raised continuously through out test

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Falex Pin and Vee Block Test

Test Material → Test Conditions ↓	Base 5W-30 Motor Oil	Motor Oil w/Old X-1R ET	Motor Oil w/New X-1R ET
Falex Pin and Vee Block @ 500 lbs			
Time, min	60		
Wear, mg	6.8		
Falex Pin and Vee Block @ 750 lbs			
Time, min	< 10	60	60
Wear, mg	Pin Broke	22.2	16.5
Falex Pin and Vee Block @ 1000 lbs			
Time, min	< 2	60	60
Wear, mg	Pin Broke	43.2	26.3

- Notes: 1) Lower the wear , better are the EP properties of oil.
 2) With new X-1R ET, amount of wear reduced by 26% at 750 lbs Load compared to old X-1R ET
 3) With new X-1R ET, amount of wear reduced by 39% at 1000 lbs Load compared to old X-1R ET



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REPORT OF RESEARCH RESULTS

I am a professor of mining engineering and head of the Mining Engineering Department at the University of Utah. In 2016, I worked with one of my students, Gates Campbell, in conducting a two tests on heavy-duty, on-road diesel engines operated by SYSCO Intermountain. These tests were conducted to determine the effects of a fuel additive provided by X-1R Corporation's distributor, Sustainable Energy Technology (SET) on fuel consumption and engine regenerations. The tests were completed on two diesel semi-tractor trailer combinations, running scheduled loaded routes. Both trucks showed an increase in miles per gallon, a decrease in engine regenerations, and decreases in NO_x and CO₂ emissions.

In the first test, baseline data on semi 1 was collected from January through April 2016. Average travel for the period was 1,400 miles per month. Baseline data on semi 2 was collected from February through April 2016. Average travel for the period was 2,900 miles per month.

A second and shorter test with the additive was conducted in August and September of 2016, to confirm the fuel consumption results of the first, and to assess the effects of the additive on exhaust emissions. The tables below summarize the results of the both tests.

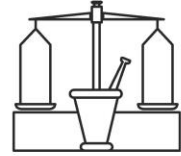
Table 1. Results of Test 1

Truck	Fuel Use, mpg		Percent Change	Regenerations per mo		Percent Change
	Without Additive	With Additive		Without Additive	With Additive	
1	4.64	4.89	5.39	2	1.5	-25
2	5.70	5.91	3.68	2	1.0	-50

Table 2. Results of Test 2

Truck	Fuel Use, mpg		Percent Change	NO _x in exhaust, ppm		Percent Change	CO ₂ in exhaust, ppm		Percent Change
	Without Additive	With Additive		Without Additive	With Additive		Without Additive	With Additive	
1	5.66	5.93	4.77	328.8	188.0	-42.82	328.8	274.9	-16.41
2	4.64	5.53	19.18	191.3	180.1	-5.85	273.2	187.7	-31.30

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The tests were conducted at the request of X-1R distributor, John Lorenzo, President of SET. Mr. Lorenzo recognized the importance of having test results from independent analysts, and when Ms. Campbell and I recognized the potential importance of the X-1R additive, we were pleased to conduct the testing at no cost to X-1R. Mr. Lorenzo assisted in making arrangements with SYSCO, and setting up the dosing system for mixing the additive with the diesel fuel as it entered the trucks. However, it is important to note that all the testing, data acquisition, and data analysis were performed solely by Ms. Campbell and myself, and that Mr. Lorenzo and other X-1R/SET personnel had no access to the test data at any point.

I wish to emphasize that neither Ms. Campbell nor I received compensation of any kind for our work on the SYSCO tests, either from X-1R/SET as a corporation, or from any individual associated with X-1R/SET. We do wish to disclose, however, that in February 2017, several months after the testing was concluded and the results were published in the *Salt Lake Tribune*, both we were each given stock in SET, not X-1R.

I have 20 years' experience in the mining and processing industries, and have worked for Kennecott Copper (now Rio Tinto Kennecott), Westinghouse Electric, CONOCO (now CONOCO-Phillips), Consolidation Coal (now CONSOL Energy), and EIMCO Process Equipment (now part of FLSmidth Minerals). I have been a mining engineering professor for 24 years—five years at the University of Alaska Fairbanks and 18 years at the University of Utah. I hold eight U.S. patents and one Canadian patent, I have contributed to 15 books on technical subjects, and have authored or co-authored 50 referred publications. I have consulted for 25 companies in the U.S. and Chile, and served as an expert witness in lawsuits in the U.S. and Australia. My full resume is available on request.

My signature is affixed below, to attest that the information in this report is true and accurate to the best of my knowledge.

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