



To: Mr. Itzhak Ovad NRG 2000 Ltd.
Director
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From: ZAHAL (IDF)
ISRAELI DEFENSE FORCES
P.O.Box 02745 our mark
0320 27.Jan.1994

Re: Summary of studies of oil additives for engines

- 1) Based on information supplied to us, there is positive influence of oil additives on the life-time of engines and other machinery parts, also the extension of interim periods between treatments, and savings in fuel consumption.
- 2) In order to examine the subject an integrated study was performed: A) Examination of NRG "additive"(surface treatment) influence on the basic characteristics of engine-oils which are currently in use in IDF. B) Studies of the extent of the improvements in engine performances as result of the treatment with the above NRG supplement.
- 3) Basic parameters of the NRG with various oils was examined in accordance with; Mil-L-2104 GR30 and Mil-L-46152 GR30 also improvement in friction abrasion was measured.
- 4) In one of IDF's camps, examination test of Diesel engines in trucks was monitored as for use of the mixture with the treatment agent.
- 5) Laboratory results: A) The physico-chemical properties of the various basic oils was not altered (IDF standards for engine-oil performances) .B) Examination of rate of erosion show improvement for the NRG treated oil also the capability to withstand higher stress demands such as higher temperatures and higher load without damage to the moving parts of the engine.
- 6) The fleet test showed trend of fuel consumption reduction and better engines performance all round for the NRG treated trucks.
- 7) It is our recommendation to consider the enhancement of NRG use for all our internal engines(benzine or Diesel) with constant monitor of the financial benefits.
- 8) To complete this activity the undersigned has issued a summary report to cover all results and such report was distributed to all relevant departments in IDF.
- 9) Best wishes

Major Dnniela Shapira
as acting officer/ COU

7. The Weekly Literature Review Summary by Prof. Ezion Yitshak (Technion)

The summary included 87 abstracts of articles, mostly referring to the lab experiments that have been performed with the engine oils. The majority of the articles refers to the inherent additives to the oil (added to the oil during the process of fabrication), and only two articles refer to the RETROFIT additive, that are added to the fabricated oil by the consumer.

The articles mention conventional additives, as: Molybdan, Di-Sulphid, and dispersions on the basis of Taflon (PTFE), and also the innovative additives, that are based on metal salts of lipid acids.

Likewise, the articles include a description of the attrition tests, based on the four balls test and on attrition tests, like FALEX, resembling the tests that we performed in the experiment. In addition, the PERFORMANCE tests on standard engines are described.

8. The Reference of Prof. Zeev Eizenshtat, the Manager of Energy Research Center at Hebrew University in Jerusalem

We have turned to Prof. Zeev Eizenshtat, the specialist in the field of fuel, oils, and oil products, in order to obtain his general opinion on additive NRG-1540, and also his specific reference about the appearance of sediment as a result of heating. His reference is as follows:

- 8.1. According to the multiple tests relating the performance of the product and its compatibility to different types of oil, there is no doubt that this is the best product, currently available on the world market (both ecologically and historically – 13 years use).
- 8.2. As for sedimentation of the material at the temperature of 100°C, the material was tested both at a temperature of 200°C, and in the real environment of different engines – diesel and gasoline – while no change in the oil filter was found. Moreover, some of the binding materials of the metal surfaces, upon which the material should perform, are liable to turn into gel, if the concentration is high and there is no dilution in the quantity of oil, in which the material should function.
- 8.3. The tests that have been carried out on civil vehicle engines in Israel and abroad, have shown good results in engine saving, especially when the rubbing factors being high. As a result, the lives of the engines were prolonged.