AFFIDAVIT OF GILBERT CHAPELET-LETOURNEUX , PhD.

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NOW COMES Gilbert Chapelet-Letourneux , first being duly sworn deposes and states as follows:

As far as fuels additives are concerned, I have been involved in research in that area since 1969. ELF AQUITAINE my company, mostly involved in oil and gas production, decided in 1967 , to start fuel marketing to final retail consumers in France and then in Europe . My challenge has been to develop the first proprietary "detergent additive for gasoline". At that time the only producers were American and I had to compete with Chevron. In less than 2 years, with my team we succeeded to launch a new fuel with a keep-clean/clean-up detergent. This was the beginning of a business for ELF: R and D and marketing of fuels additives. Then came flow improvers for diesel fuels, combustion improvers for middle and heavy fuels, detergent for diesel fuels and a new additive for gasoline taking care of the cleanliness of the entire inlet systems.

It was 1979 and the introduction of unleaded fuels in Europe was expected in 10 years. This was a major challenge for the refining process; and the first estimations were that we would have to face a drastic loss in average octane capability. We decided to work on a double strategy:

- Improvement of refining processes (which was the classical way)
- Decreasing the **Octane Requirement Increase (ORI)** of engines. The octane "appetite" is increasing with running time of engines, due mostly to the accumulation of deposits in the combustion chamber. For instance an engine designed to run on an 87 octane gasoline would require a 91 octane (or more) fuel after 20,000 miles. So if one can take care of those deposits, this would result in a lower octane demand, and a lower quantity of crude oil to be processed (about 5% per octane number).

The management of Octane Requirement appeared as a very strategic issue. For this reason a long term research program was set-up, the very first step was to develop a simple and short time engine test to be able to select the efficient possible additives and to match the results obtained on bench tests with known but very expensive road tests (7,000 to 15,000 miles). This took more than 5 years.

In 1985 I became the Strategic Manager for Products (fuels, lubricants, asphalt, additives). At that time it was appearing in the automotive literature that detergent additives were increasing the Octane Requirement (compared with the same fuel without detergent). So, two ways had to be investigated:

- A) to select or create detergent package additives which would not increase the OR
- B) To create an additive which would decrease the OR of a fuel with a detergent system, *below the OR of the original fuel.*

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We had only 4 years before launching the new Unleaded Fuel. I decided to meet the 2 companies (both American: Chevron and Texaco) which were appearing in the literature and patents to work on OR management and suggest a research cooperation. Texaco was immediately very positive. As we were not competing on the fuels market (except UK), an R&D agreement was signed in 1986 which resulted in launching in 1989, for ELF in Europe and for TEXACO in the USA, a fuel with a controlled Octane Requirement Increase. We were only reaching the first goal (A): the detergent package did not increase the ORI of the fuel without additives. The second goal (B) was still remaining: reach an ORI below the one of the neat fuel.

In the meantime, in 1988 I meet with PMC President Mark Nelson. When he showed me some test results, and a picture demonstrating a very clean piston top of a Harley Davidson engine, run for 3500 miles with a fuel containing PMC's additive Duralt, I decided to test it immediately (bench tests and road tests, with leaded and unleaded fuels). *The results were outstanding*: decrease of ORI by 50 to 80%.

Unfortunately, it was too late to work with Duralt. Launching a new fuel is an incredibly long (about 24 months) and expensive process: bench tests, road tests, emissions tests to prove the benefits, to check for no detrimental effects.

In 1989 we decided to continue the preliminary tests on Duralt, to reach the second goal (B). First, we had to compatibilize Duralt with our detergent to build a package stable in storage and easy to utilize in our depot to additive fuels automatically. In parallel, new bench tests and road tests were successfully performed. And in 1990 an Option Agreement was signed between ELF and Polar, including the possibility, if Polar could not provide the necessary quantity of Duralt requested by ELF, that Polar would give ELF the manufacturing process via a licensing agreement.
But in 1992 POLAR was taken over and the relationship with ELF stopped. Nevertheless, ELF completed the development of a package Detergent+Duralt meeting (B) goal (done in 1994). I was transferred to a new position in 1993 (Head of High Tech Fuels, including racing fuels and lubricants)

Mark Nelson recovered his company in 1995. We had a contact and I managed to organize a meeting in Paris with the ELF President of R&D for Refining and Marketing: a new contract "Memorandum of Understanding" was signed. The main problem for Polar was the ***lack of funding***. On the ELF side the pressure on the lack of octane had decreased.

In 1999, ELF merged with TOTAL-FINA and became the world's 4th largest oil company.
On September 11, 2001 a marketing agreement was signed between Polar and TotalFinaElf. A related funding for Polar was lost due to a recession in the U.S. financial markets following 9/11.
In January 2002, a meeting with the management of Total-Fina-Elf additives was held in France. Mark Nelson was given, by the 2 managers, a forecast for TotalFinaElf operations in Europe, Asia, Africa, to purchase $40 million of DURALT per year, *provided that Polar launch the marketing in the USA.*

In 2002, I retired from TOTAL-FINA-ELF. I decided to join Polar as a consultant for the Oil Industry and consolidated the relationships with the Total-Fina-Elf Additives Department. Based

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on tests results obtained in a Joint Research Project Polar/Total-Fina-Elf, a patent was issued to Polar for Duralt ~~associated to the different~~ detergent chemistries .

In fall 2002, a very positive meeting with FORD Engine Research was held in Dearborn, Michigan. Attendants were :

- For TOTAL-FINA-ELF: Head of Total-Fina-Elf Additives and the Senior Research Engineer for TotalFinaElf additives
- For FORD: ~~six people of the Engine~~ Research Department , including the Head of the Department.
- For ~~POLAR~~: Mark Nelson, Chandra ~~Prakash~~ (Environmental Fuel Consultant) , Alan Smith(Automotive Consultant) and myself.

At the ~~meeting~~ , Total-Fina-Elf Additives made a power point presentation (P-910-P-911) detailing all the positive results on Duralt for ORI and combustion chamber deposits control , with and without detergent packages. During the discussion , it appeared that due to the fact that Duralt was controlling the ORI of the ~~engine~~ , the number of activations of the ~~knock~~ sensors would decrease which could result in a fuel economy improvement of 3 to 5 %. *This is a direct effect of Duralt on an existing engine* already operating on the road.

Now, if Duralt was added to *all the fuels* in a country , it would allow the car industry to set-up the engine at higher compression ratios , resulting in a general fuel economy improvement of 2 to 3 % ; as well as a reduction of ~~emissions~~ .

A plan was suggested:

- To run preliminary tests to check the fuel economy related to the decrease of activations of knock sensors and the associated fuel economy . Tests could be run by Southwest Research, (SWRI~~), in San Antonio, Texas, to be~~ managed by POLAR. (Estimated cost $ 1 million.).

- Ford would go to the California Air Resources Board,(CARB), and suggest a large fleet test with existing engines and with engines reset to higher compression ratio by car industry , able to run with low octane fuels . Check for fuel economy and emissions (including greenhouse emissions). Check with oil companies, what type of crude oil saving could result. This program would involve the Automotive Industry, Oil industry and be run under the CARB control.

As a conclusion of the meeting, one person from the FORD Engine staff mentioned that looking at the benefits brought by Duralt (control of Octane Number Requested by an engine), *Duralt was as important as tetraethyl lead* (commonly called lead) has been for the Automotive and Oil Industries , at the beginning of the last century.

Because of the lack of finance for Polar , the SWRI tests could not be run.

Nevertheless, to protect DURALT , 7 new patent applications were filed covering the use of Duralt:

- Associated to the main types of fuels; with MTBE, with ETBE, with MMT, with ethanol, with biodiesel, with ferrocene, and with tetraethyllead.
- Associated to different types of detergent chemistries in diesel fuels.

I was a named co-inventor on the patent applications, with Otis Nelson, Mark Nelson, and Chandra Prakash. (The U.S. patent applications were to be followed up with foreign applications in key markets world-wide.) None of them were rejected. However, ***due to the lack of financing***

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and to the foreclosure in 2007, the patents could not be successfully prosecuted to issuance. In 2009, despite initiation of a Duralt project with Sinopec in China, Carb, and a new agreement with Total Additives to replace the one that was expiring, the foreclosure on the intellectual property of Polar commenced in 2007 was completed.

IN CONCLUSION :

ELF and then TotalFinaElf ran successfully more than 200 engine tests (bench, road) to certify that Duralt was controlling ORI and combustion deposits with and without detergents and with leaded and unleaded fuels.

To commercialize a new additive technology requires extensive Research and Testing and Financing over a long period of time. This is the rule to gain the acceptance of key Oil and Automotive companies. Stop-and-go process in running an R&D project is extremely detrimental.

In Summary:

- DURALT is a **unique, fully organic,** additive which can manage, in gasoline engines, the control of the Octane Requirement Increase and of combustion chamber deposits , which are the key limitations for the Auto and the Oil Industry. Because of ORI , the car industry is bound to detune the engines (to set engines at a lower compression ratio, resulting in an increase in fuel consumption and emissions ,including greenhouse gas emissions). This has been reported by Polar in a Society of Automotive Engineers (SAE) scientific paper (1989: Broad Spectrum Fuel Additive) based on American , European and Japanese engines. Tests run by TotalFinaElf were run on European engines . That is to say that whatever is the type of engines , Duralt works.
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- And the oil industry is bound to produce fuels at a higher octane number , resulting in a loss of yield of gasoline production, based on crude oil. The ability of Duralt to offset this problem is reported in another SAE paper (1990 : ORI control, a way of saving).

Due to the lack of control of the Octane Requirement Increase , Oil and Automotive industries are losing. More crude oil is required. Fuel consumption and emissions are increasing.

- *As far as the market volume is concerned* , the worldwide need from Duralt reached a peak by 2005-2006, due to the high price of crude oil and the issue of eliminating greenhouse emissions. At that period the market drivers worldwide were opening up sales opportunities and financings.
- **Duralt is a solution.**
- But the business interruptions; the 1992 take over, the 2007 foreclosure, and the resulting lack of financing , prevented the Duralt solution from being implemented for the benefit of the Auto and Oil Industries, the Environment, and Polar Molecular Holding Corp and the stockholders who lost a multi-Billion US dollars market opportunity and lost the value of its stock in PMC.

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Dated: 03/18/2015

GILBERT CHAPELET-LETOURNEUX

Citizen Of France Passport No. 12DD23515

SIGNED AND SWORN TO ME, A NOTARY PUBLIC FOR THE UNITED STATES OF AMERICA, ON THIS DAY OF 18th MARCH, 2015.

Ann Marie CHIAPPETTA
Consul of the United States of America

, NOTARY PUBLIC

Republic of France City of Marseille
Consulate General of the United States of America

~~COUNTRY~~ SS, ~~UNITED STATES OF AMERICA~~

MY COMMISSION EXPIRES INDEFINITE

Sujet: TESTIMONY
De : Gibert Chapelet-Letourneux <gilbert.chapelet-letourneux@orange.fr>
Date : 31/10/2012 19:54
Pour : mark nelson <polartech@comcast.net>

This is my testimony .
Done by Gilbert Chapelet on October 31, 2012 at :

Chemin de Saint Roch
F- 84490 SAINT SATURNIN D'APT (France)

Marvin

From earlier affidavit

Interesting background information

Mark

PRELIMINARY COMMENTS

A gasoline engine transforms the energy content of a fuel in a mechanical energy , according to the following scheme :

- a mix gasoline/air , injected in a cylinder , is flammed by a spark , at the entry of the cylinder. The gases so formed moves forward , pushing the piston at the top of the cylinder , the piston moving , in the same time , the camshaft.
- if the gasoline has a burning ability (*octane*) too low for the pressure at which the cylinder has been designed and tuned , a misfiring (*knocking*) happens which results in a loss of performance , an increase in fuel consumption and in pollution ; and , even, in piston destruction.
- the problem is that with its mileage , because of deposits build up in the cylinder (*combustion chamber*) , the finally requested gasoline has an octane exceeding the original capability of the engine by 3 to 5 numbers (*Octane Requirement Increase* or *ORI*) , to secure the engine . This is a major loss in gasoline production based on the crude oil necessary to produce such a fuel (up to 10% or more , depending in the type of refining scheme).
- the Auto Industry has adressed part of the ORI problem , by settling a knock detector , which avoids knocking by detuning the engine , which results , unfotunately , in a loss of power, an increase in fuel consumption and in pollution .

DURALT ADRESSES THE ORI PROBLEM OF A GASOLINE ENGINE BY CONTOLLING THE ORI PHENOMENON .

RESUME

Gilbert CHAPELET background is Chemical Engineering . Then , did a PhD in Physical Chemistry under the supervision of Nobel Price in Physics Louis NEEL and cooperation with future Nobel Price in Chemistry Jean-Marie LEHN.
Joined rapidly ELF AQUITAINE (which later on by joining TOTAL becomes the number 4 Oil Company in the world) as a Research Fellow and then Research Manager . Started the Elf Aquitaine Fuels Additive business.
Moved then to the management of a new Technology of Purification of High Value Chemicals , gaining 2 Top Honors Awards from Chemical Processing (1980) and from Chemical Engineering (1981) , 2 major american scientific Publications. Application , for instance , to the purification of silane for the production of chips , of Insuline (Eli Lilly), of cannabis extract for helping to cure cancer , in the frame of the NHA US program , ...
Moved back to the Oil Industry , as VP Research for Products (Fuels, Lubricants and Asphalts). Participation to two major research programs between the Oil and the Auto Industries : American Auto Oil program and , later on , initiator of the European Auto Oil program . Very active participation to the American Asphalt Research Program (largest in the world). Very active development of new fuels, lubricants and asphalts , particularly Polymer modified asphalts which Elf became number one producer in the USA .
Finally , became Director of the Elf Aquitaine High Tech Fuels Department.
At the very end joined TOTAL.