Legal Claims
Against Lubrizol Corporation

By
Mark L. Nelson

Co-Founder, Co-Inventor
CEO
Polar Molecular Holding Corporation
Parent of Polar Molecular Corporation

July 24, 2017

Volume II
Exhibits 1-10, Footnote 1

Inter Office

Director
Commercial Truck Quality
Commercial Truck Vehicle Center

September 14, 1995

To: Whom it may concern

Subject: Advertising Claims for Fuel Additive Duralt

This is to confirm that I wrote and signed the attached memo, "Advertising Claims for Fuel Additive Duralt," to Mr. R. G. Girolami, on July 19, 1989. At that time, I was an Engine Design Manager and part of my responsibilities were to review test results and sign-off on advertising claims for my particular products. Mr. Girolami, as a Manager in Ford SVO, was considering a proposal to after-market Duralt, and asked me to document the claims that I believed were substantiated by data.

Mr. Mark Nelson of PMC, had been meeting with me and others at Ford for a few years at this time, providing suggestions to their research plans and reviewing test results. I personally reviewed the data they provided and concluded that the claims in my letter, referenced above, were substantiated.

I would be pleased to discuss this further with you or a representative of your company, or visit with you when you're in the area.

Very truly yours,

Allan L. Smith

Director, Commercial Truck Quality

Attachments (2 pages)

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POWERTRAIN ENGINEERING
July 19, 1989

To: Mr. R. J. Girolami

cc: Mr. M. L. Nelson (PMC)

JUL 25 1989

Subject: Advertising Claims for Fuel Additive Duralt®

I have reviewed test results for the fuel additive, Duralt®, beginning in 1983. Over the last six years, the PMC people have periodically shared new test results with myself and others in Ford, both through meetings and direct mail. At the same time, they have followed suggestions for further testing they could conduct which might further validate the positive results they were experiencing with the use of their product.

Their tests include both substantial fleet experience as well as statistically valid, controlled experiments conducted by credible, independent testing organizations (including Ricardo, ECS, SWRI, and NIPER Labs). A summary of their data was published by the SAE this year (SAE Technical Paper #890214, "A Broad-Spectrum, Non-Metallic Additive for Gasoline and Diesel Fuels: Performance in Gasoline Engines").

In summary, I conclude that there is sufficient data to support the following advertising claims for the use of Duralt® as a fuel additive in the amounts prescribed by the manufacturer.

In gasoline engines it:

1. Reduces hydrocarbon exhaust emissions about 10% in nearly new engines, and by an average of 60% in inspection-type tests in vehicles that have accumulated at least 20,000 miles.

2. Reduces the octane requirement increase (ORI) by about 70% (up to 6 octane numbers in U.S. cars) at the recommended treatment level.

3. Increases the road octane number by about 0.5.

4. Reduces fuel consumption by about 1-1/2% in newly-tuned automobiles to about 8% in less well-tuned autos.

5. Reduces combustion chamber deposits.

6. Allows conversions of engines from leaded to unleaded gasoline without loss in performance.

7. Reduces exhaust valve recession in engines prone to the problem.

acfad.1(1)

CONFIDENTIAL

In diesel engines it:

8. Reduces particulates in an IDI engine by about 40% at the recommended treatment level.

9. Reduces maximum-load smoke in a 2-stroke engine by 25 to 60%.

10. Reduces hydrocarbon emissions in the IDI and 2-stroke DI engines by 13 to 43%.

11. Reduces carbon monoxide emission in the IDI and 2-stroke DI engines by 6 to 22%.

12. Increases cetane an average of 2-1/2 numbers.

13. Reduces diesel fuel consumption about 2 to 4%, and sometimes as much as 15%.

14. Reduces injection coking.

15. Reduces engine noise.

16. Improves fuel stability in storage.

A. L. Smith, Manager
Tempo/Topaz/ST44/CDW27 PT Dev. Dept.

:wgh
k3820
7/19/89
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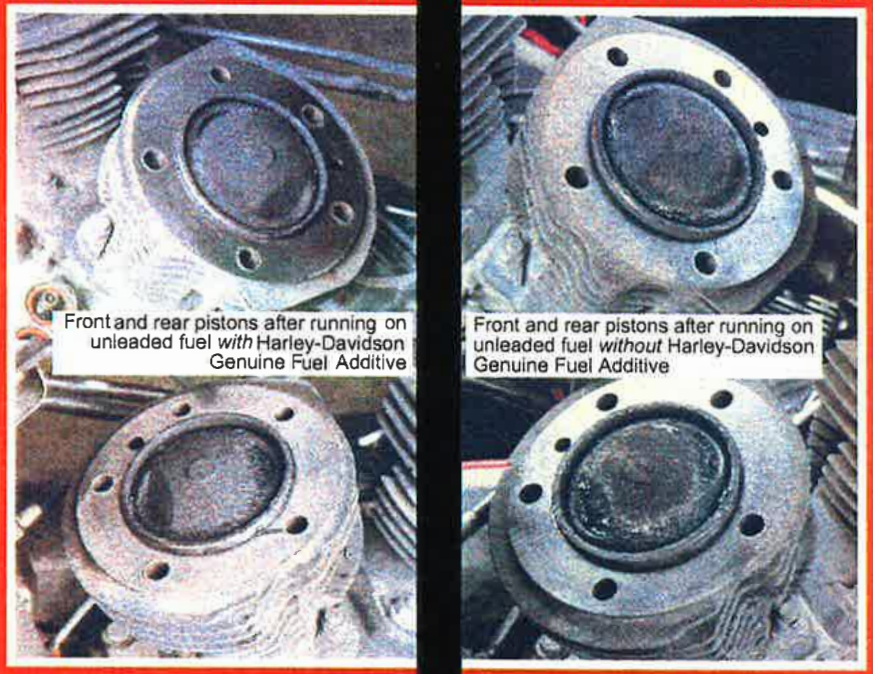
DurAlt. Harley-Davidson's® solution to unleaded fuel.

With:
Harley-Davidson Genuine Fuel Additive

Without:
Harley-Davidson Genuine Fuel Additive



With Harley-Davidson Genuine Fuel Additive added to unleaded fuel, combustion chamber deposit is prevented from forming, and previously formed deposit is reduced.

Without Harley-Davidson Genuine Fuel Additive added to unleaded fuel, the combustion chamber deposit is greater, more abrasive and more carbonaceous as evidenced by the white ash deposit formation.

MOTOR HARLEY-DAVIDSON COMPANY

The results are clear. The evidence is conclusive. Harley-Davidson Genuine Fuel Additive, formulated with DurAlt, provides superior upper cylinder lubrication. Reduces engine wear and maintenance. Reduces corrosion and combustion chamber deposits. Improves driveability and fuel efficiency. Alleviates valve seat recession. And eliminates the need for leaded fuel in older engines. Add some to your fuel today.

DURALT™

The engines compared here were assigned to run on leaded fuel. Each engine has approximately 30,000 miles on it prior to testing, which was conducted over approximately 3,500 miles.

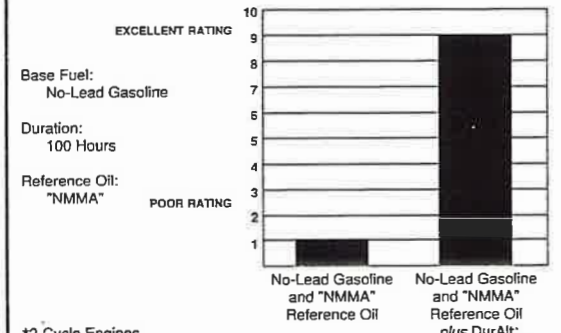
DurAlt®
Marine Fuel Conditioner
does it all!

DurAlt® Marine Fuel Conditioner Treatment Ratios

Quantity of DurAlt® MFC		Gasoline	Diesel Fuel
1/4 oz.	treats	4 gal.	3 gal.
1/2 oz.	treats	8 gal.	6 gal.
1 oz.	treats	16 gal.	12 gal.
8 oz.	treats	128 gal.	96 gal.
16 oz.	treats	256 gal.	192 gal.
1 gal.	treats	2,000 gal.	1,500 gal.
2.5 gal.	treats	5,000 gal.	3,750 gal.

Ask your dealer about convenient bulk treatment.

National Marine Manufacturers Association (NMMA)
ENGINE CLEANLINESS RATING*



*2-Cycle Engines

POLAR MOLECULAR HOLDING CORPORATION

MERCURY MARINE

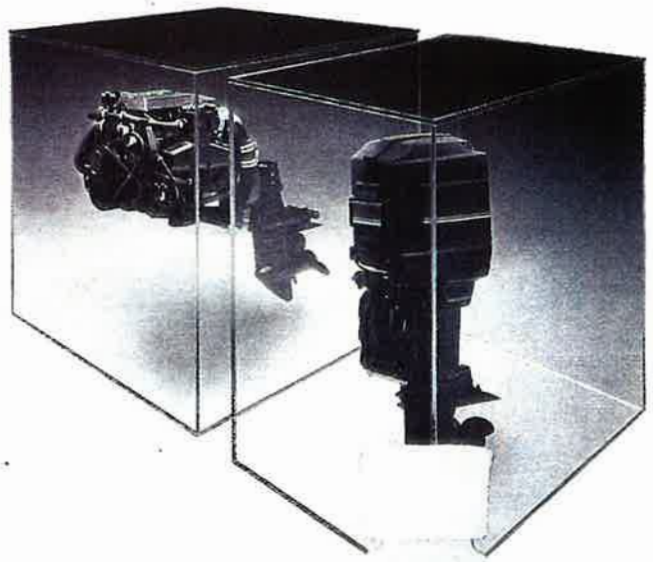
Polar Molecular Holding Corporation
9457 S. University Blvd., #312
Highlands Ranch, CO 80126
303-552-1267
PolarTech@Comcast.Net

Printed on Recycled Paper

JOIN US IN THE FIGHT AGAINST POLLUTION!
USE DURALT® FUEL CONDITIONER TO REDUCE EMISSIONS.
USE RECYCLED PAPER TO REDUCE WASTE.

M3000-0016

HERE'S ONE WAY TO COMPLETELY PROTECT YOUR MARINE ENGINE.



Environmentally Responsible

HERE'S THE BEST WAY.

Now you've got complete, state-of-the-art protection against maintenance problems and performance bugaboos today's unleaded fuels can cause. **You've got DurAlt® Marine Fuel Conditioner.** The best overall protection for all 2- and 4-cycle marine engines.

DurAlt MFC is the most effective non-metallic marine fuel conditioner available anywhere. The DurAlt MFC secret is a non-metallic, polar ingredient that's environmentally safe. It is truly unique—completely different from any other fuel additive on the market today.

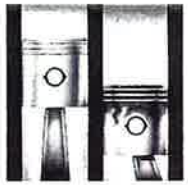
DurAlt MFC gives your marine engine a better bang!

Very simply, **DurAlt MFC improves combustion.** With a number of very important results.

Your marine engine is challenged to perform in extremes of heat and moisture. In that environment, especially with today's fuel, your engine really needs DurAlt MFC. It's very effective against damage and downtime. At the same time it adds to the power, performance, and pleasure you bought your boat for.

Here's just what DurAlt MFC does*:

- **Reduces octane requirement**
  DurAlt MFC's non-metallic formula makes this possible. Metal-based additives allow the formation of harmful deposits, which drain power and efficiency from engines.



- **Eliminates or reduces combustion knock and detonation**
- **Fights rust and corrosion**
- **Cleans combustion chambers, rings, and pistons**
  In 2-cycle engines, DurAlt MFC reduces ring deposits and sticking that wear away cylinder walls. (See Engine Cleanliness Rating chart on back page.)
- **Prevents valve burning by reducing deposits**
- **Reduces valve seat recession**
- **Stabilizes fuel by reducing gum formation**
- **Increases fuel efficiency, improves power and performance**
  Substantial fuel savings—greater cruising range
- **Prevents spark plug fouling**
  Even when trolling
- **DurAlt MFC is safe**
  Contains no low-flashpoint alcohols or deposit-forming metallic lead substitutes.
  If spilled, will not harm or stain fiberglass, chrome, stainless steel or aluminum.
- **EPA accepted as "substantially similar"**
  The only effective lead substitute that can be used for bulk treatment and sold as unleaded.
- **Reduces emissions**
  DurAlt MFC *actually reduces* hydrocarbon emissions because it improves combustion.
- **Race-proven protection**
  Recommended by Team Double Force and Wildfire Offshore Racing
- **Will not void engine warranties**
- **Environmentally responsible**
  Contains no nitrogen or phosphorus, which are known to cause eutrophication of lakes (algae blooms and excessive plant growth).

DurAlt MFC gives you incredible value.

You get all the benefits listed above for just pennies a gallon. One 8-oz. bottle (with dispenser top) treats 128 gallons of marine fuel. Your marine products dealer also stocks a handy 16-oz. size. Both sizes have convenient measuring increments right on the bottle. (See reverse side of this brochure for treatment levels.)

You're also welcome to hear the enthusiastic response of marine engine owners like you who've been using DurAlt MFC for a season or two.

One very important testimony is that Michigan (the state with the biggest per capita boating population in the country) has recommended the use of DurAlt MFC, making it the only conditioner used in all fuel sold in state-operated marinas. In fact, over 70% of **all** Great Lakes shoreline marinas in Michigan treat with DurAlt MFC.

FOR IMMEDIATE RELEASE
October 2002

TOTALFINAELF ADDITIVES AND POLAR MOLECULAR CORPORATION ANNOUNCE WORLDWIDE JOINT MARKETING AGREEMENT FOR ENVIRONMENTAL FUEL ADDITIVE TECHNOLOGY

TotalFinaElf Additives, (Solaize, France) a division of TotalFina Elf and Polar Molecular Corporation (a fuel additives manufacturer based in Denver, Colorado) have signed a Joint Marketing Agreement to sell Polar's patented DurAlt® FC fuel additive technology combined with TotalFinaElf gasoline and diesel additive technology to a worldwide market. Considered one of the "Super-Majors", TotalFinaElf is the largest oil company in Europe and the fourth largest in the world.

(Left to Right) Dr. Bernard Y. Damin, TotalFinaElf Additives,
Mark L. Nelson, Polar Molecular Corporation, and
Dr. Alain J. Faure, TotalFinaElf Additives

The agreement provides for the joint marketing and sales of DurAlt® FC fuel additive technology combined with TotalFinaElf gasoline and diesel detergent additive packages to major oil companies throughout the world for bulk-treatment at the refinery level. TotalFinaElf Additives division will lead the marketing and sales effort in Europe, Africa, and Asia with market and technical assistance from Polar Molecular Corporation (PMC). PMC will lead the sales effort in north and south America with market and technical support from TotalFinaElf Additives.

"Due to recent environmental market developments, a unique window of opportunity has opened for PMC and TotalFinaElf Additives to market our combined technologies to major oil companies around the world", said Dr. Alain Faure, General Manager of TotalFinaElf Additives.

"The market developments include increasing pressure on automakers to improve fuel economy and emissions standards, the anticipated phase out of the smog-fighting, octane-boosting additive MTBE from the United States gasoline pool, the phase out of lead octane boosting additives by countries around the world, and the signing of the Kyoto Accords to reduce greenhouse gas emissions. PMC and TotalFinaElf Additives are actively pursuing these opportunities", said Dr. Faure.

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Research for the combined fuel additive packages is being conducted at TotalFinaElf Research. The extensive TotalFinaElf Research Center in Solaize, France is dedicated to product development. The Research Center is considered one of the finest and most advanced in the world, specializing in the area of fuels and lubricants additive technology for current production engines and advanced engine designs. TotalFinaElf Additives also collaborates with automakers in research conducted at the TotalFinaElf Research Center in Solaize, France.

"Oil companies and automakers are cooperating to meet fuel economy requirements and emission standards, including reducing greenhouse gases to combat global warming. Fuel additives such as detergents are added to gasoline by refiners to keep engines running cleaner and more efficiently. However, detergents cannot clean the carbon deposits that form in an engine's "combustion chamber" due to incomplete combustion. These combustion chamber deposits (CCD's) drive up an engine's octane requirement (octane requirement increase) as much as five or more octane numbers within the first 10,000 miles and rob the automakers of their ability to design better fuel economy into their engines" stated Alan Smith, PMC Vice President, Senior Automotive Industry Advisor.

"In tests conducted at TotalFinaElf Research Center, DurAlt® FC, combined with TotalFinaElf Detergent Additives, substantially reduces the problem of octane requirement increase, allowing automakers to significantly improve the fuel economy of their engines and thus reduce greenhouse gas emissions. The TotalFinaElf Research Center is now a viable resource for the worldwide proliferation of the combined TotalFinaElf Additives and DurAlt® FC technology", said Dr. Bernard Damin, Technical Cooperation Manager of TotalFinaElf Additives.

"Polar Molecular Corporation and TotalFinaElf Additives are positioned to share in revenues from potential business with oil companies in North America, South America, Europe, Asia and Africa. With support from automakers that require the benefits of our combined technologies, the market potential is unprecedented" said Mark L. Nelson, President and CEO of Polar Molecular Corporation.

"This worldwide joint marketing agreement, with the additives division of one of the largest oil companies in the world, combined with a leading market position, prepares PMC for rapid market penetration in sales to major oil refiners for the first time in the company's history. The agreement with TotalFinaElf Additives is a strategic breakthrough for PMC", said Nelson, "providing PMC the corporate profile of a credible supplier of proven, cutting-edge, fuel additive technology to major oil companies around the world combined as well as world class technical and research support".

Exhibit # 4

The Engineering Society
For Advancing Mobility
Land Sea Air and Space®
400 COMMONWEALTH DRIVE WARRENDALE, PA 15096

SAE Technical Paper Series

890214

A Broad-Spectrum, Non-Metallic Additive for Gasoline and Diesel Fuels: Performance in Gasoline Engines

O. L. Nelson, Jr. and J. E. Larson
Polar Molecular Corp.
R. S. Fein, D. D. Fuller and G. K. Rightmire
Scientific Advisor to Polar Molecular Corp.
R. W. Krumm and G. E. Ducker
Pfizer, Inc.

International Congress
and Exposition
Detroit, Michigan
February 27–March 3, 1989

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ABSTRACT

This paper describes the performance of a single, multifunctional additive that alleviates many of the common gasoline and Diesel fuel problems. The additive has been deemed "substantially similar" by the EPA and thus may be used for bulk treatment of unleaded gasoline.

Test data obtained from several independent laboratories are presented. The results show that the additive limits octane requirement increase (ORI) to an average of about 30% of that experienced when using untreated gasolines; reduces hydrocarbon emissions by the order of 10% or more; improves fuel economy approximately 1.5% - and often much more - in a variety of engines; and also reduces exhaust valve recession and combustion chamber deposits.

The additive effects on Diesel engine performance and on combustion modification in both gasoline and Diesel engines will be reported later.

RECENT DEMANDS ON ENGINE PERFORMANCE AND FUELS

Compliance with environmentally based mandates has forced automobile manufacturers to produce spark-ignition (SI) engines that operate reliably with curtailed evaporative and exhaust emissions and improved fuel economy while using unleaded gasoline.

These engine performance constraints have been met by using increasingly sophisticated induction, piston/combustion-chamber, exhaust, and control systems. Maintenance and performance of these systems has placed demands on gasoline quality which are being met by bulk treatment with special purpose, detergent and dispersant additives, and by using higher octane gasoline.

Detergent and dispersant additives quite effectively deal with induction system deposits, but have not been very effective in preventing Octane Requirement Increase (ORI), presumably from combustion chamber deposits associated with extended use.

Refiners, as a consequence of lead phasedown and greater octane requirement of unleaded gasoline, have been experiencing growing difficulty in meeting the demand for increased octane levels. This demand has led to: (1) increasingly severe catalytic cracking, and (2), the expanded use of octane enhancing oxygenates (methyl t-butyl ether and alcohols) in gasoline.

Heavier, higher sulfur crude oils along with the more severe catalytic cracking have raised aromatic, olefinic and sulfur contents. Consequently, the quality of both Diesel fuel and heating oil has gradually deteriorated. The aromatics and olefins have lowered cetane number and the aromatics and sulfur have increased exhaust particulates and smoke from Diesel (CI) engines, gas turbines and furnaces.

Several single-purpose additives have been used in Diesel fuel to raise the cetane number, reduce the cloud and pour points, prevent oxidative and bacterial deterioration in storage, and reduce exhaust smoke.

In contrast, the additive described in this paper is a single, multifunctional concentrate, for use in both gasoline and Diesel fuels (including gas turbine fuels and heating oil) to reduce many of the problems mentioned above.

The paper presents the results of SI-engine evaluations by several, independent laboratories, identified in Appendix A.

Topics addressed are ORI, passenger car exhaust emissions, fuel economy, octane number and octane related engine performance, and valve seat recession. Results showing that the additive affects CI-engine injector deposits, engine combustion noise, exhaust emissions, fuel economy, cetane number, cold fuel flow, and fuel storage stability will be published subsequently.

A summary of several fleet tests is also included at the end of the paper as evidence of acceptable field performance.

ADDITIVE HISTORY — The additive discussed in this paper was initially developed to improve fuel economy of internal combustion engines without degradation of exhaust emission control systems. It was subsequently observed that the additive had a knock-reduction effect in SI-engines and a cetane improvement effect in CI-engines, and reduced hydrocarbon and smoke emissions. This behavior suggested that the additive might have an important effect in modifying the combustion process and in controlling combustion chamber deposits.

ADDITIVE DESCRIPTION — The additive is a several-component mixture of materials containing only carbon, hydrogen and oxygen; U.S. Patent No. 4,753,661, June 28, 1988. It is a blend of oxygenated aliphatic hydrocarbon liquids, glycol ethers, and hydrocarbon fuel solubilizers. The active components are a polar material, compatibilizers for the polar material and hydrocarbons, and a compound for enhancing the water tolerance of the additive.

0148-7191/89/0227-0214$02.50

The additive has been designated "substantially similar" by the EPA, and may thus be used for the bulk treatment of unleaded gasoline. (1)*.

Typical physical properties of the additive are:

Specific Gravity	0.89
Flash Point	43 °C
Color	Clear Amber

Note: All concentrations of additive-treated fuel are expressed in parts per million (ppm) by volume. Concentrations from laboratory L-4 are conversions from mass concentrations.

SPARK-IGNITION ENGINE LABORATORY AND ROAD TESTS

OCTANE REQUIREMENT INCREASE — Octane requirement increase is observed with extended operation of gasoline engines. In order to maintain normal engine performance, under these conditions, a higher octane fuel is often required. Although a number of factors may be involved in the phenomenon of ORI, combustion chamber deposits are recognized as being a major contributor to the problem. The effect of the additive on ORI was determined by Laboratories L-3, L-4, and L-6 using three different test procedures and five engine/base fuel combinations.

10 Car Road Test — Laboratory L-3 tested six 1985 cars manufactured by Company A and four 1984 cars manufactured by Company B. The Group A cars were equipped with 3.0 liter V-6 port-injected engines and automatic transmissions; the Group B cars were equipped with 2.3 liter 4-cylinder carburetted engines and automatic transmissions. Cars within Group A consisted of three each of two body styles of the same size. All cars in Group B had the same body style.

In preparation for testing, the cylinder heads of each of the cars were removed and the combustion chambers cleaned. The valve train assembly (especially the valve guide clearances) were inspected to insure that undue amounts of lubricating oil would not enter the combustion area and thus affect the test results. Crankcase oil was changed and oil, air and fuel filters were replaced, together with spark plugs, EGR and PCV valves. Each of the engines was then tuned to manufacturer's specifications.

The gas tanks were drained and filled with a commercially available unleaded regular fuel obtained from a single batch. The cars were then driven for approximately 100 miles, under identical conditions in an attempt to equalize combustion chamber deposits. At this point, octane requirement evaluations were made with a chassis dynamometer, using the CRC designated E-15-87 test procedure. The initial octane requirements for each of the ten cars was thus established.

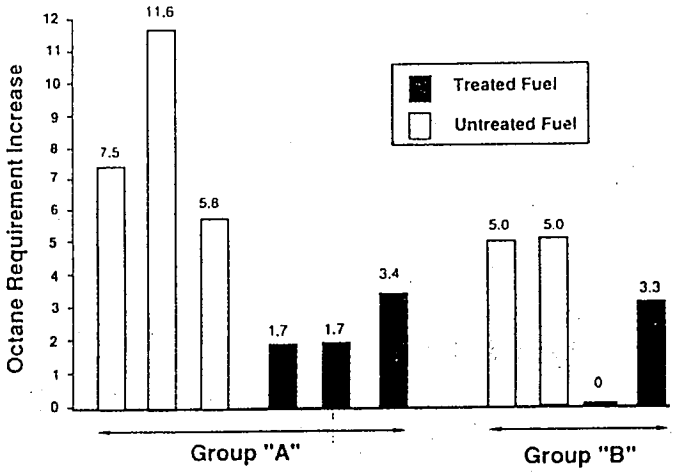
Fuel for half of each of the Group A and B cars was treated with the additive at a concentration level of 667 ppm. A closed route representing both city and country driving conditions was followed with all of the vehicles traveling in line. The 100-mile route was traversed at an average speed of about 64 km/hr (40 mph), with the maximum speed limited to 97 km/hr (60 mph). Vehicle order in the line and vehicle-driver combinations were rotated.

Octane requirement levels were determined for each of the cars after 2,500 and 5,000 miles. Based on the trends of the results, the Group A cars were subsequently run to 8,000 miles. The Group A car tests were then terminated, since the laboratory judged that the octane requirements had essentially stabilized.

The octane requirements among the Group B vehicles were smaller than the Group A vehicles. Therefore, Group B test duration was extended to 10,000 miles to assure that equilibrium had been attained. The octane requirement results are shown in Table 1 and the ORI's are summarized in Figure 1. Mean ORI with the additive treated fuel was 6.0 octane numbers lower than with untreated fuel for Group A cars and 3.3. lower with Group B cars.

Figure 1

Octane Requirement Increase
Over Test Duration
(R+M)/2



1.6 L Engine Test — An additional ORI evaluation was made by Laboratory L-4, with a European 1.6 L, 4-cylinder, crossflow 4-stroke engine with a compression ratio of 9:1. The twin choke carburetor was modified to permit air/fuel ratio adjustment by control of float chamber pressure.

The engine was initially run-in for 20 hours over a range of speeds and loads. The test schedule in this case took the form of a 200 hour mixed-cycle run, with octane requirement, part-load exhaust emissions and fuel consumption being determined at 50 hour intervals. Octane requirement was determined from the spark advance producing borderline knock. The cycle used in this test program is listed in Table 2. It is representative of a typical European engine duty cycle.

The 200 hour test was completed twice, first with the baseline fuel and then with 424 ppm of the additive. Prior to each test the engine was stripped, cleaned and measured.

The initial octane requirement of the engine at the start of the baseline fuel test was 93.5 RON. After the 200 hour run, this increased by 2.8 to 96.3, as shown in Figure 2.

After rebuilding the engine, the initial octane requirement was 94 instead of 93.5. After the 200 hour run, the octane requirement with the additive, had increased by 1.2 to 95.2. Thus, ORI with the additive was reduced 1.6 RON from that for the baseline gasoline, or a 57% reduction in ORI requirement.

(*) Parenthetical numbers refer to references included at end of paper

TABLE 1
OCTANE REQUIREMENT
(R + M)/2

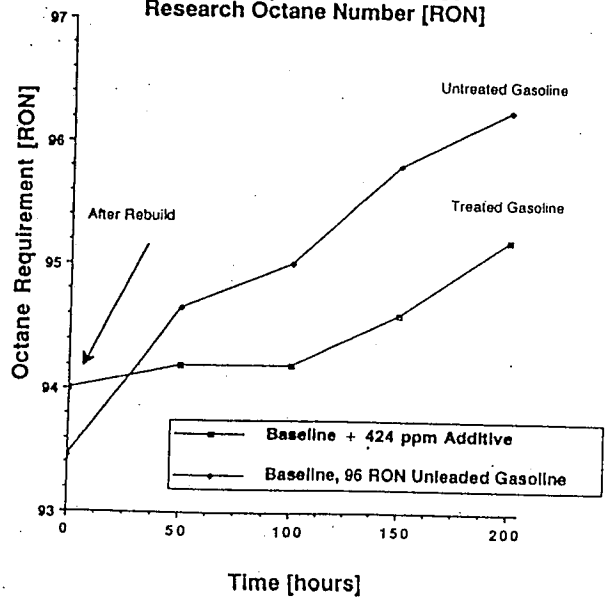
Group A Car No.	Concn. ppm	MILES ACCUMULATED 0	2500	5000	8000	10,000	FINAL ORI
1	0	80.8	87	87	88.3	-	7.5
2	0	80.8	84.2	90.8	92.4	-	11.6
4	0	82.5	88.3	88.3	88.3	-	5.8
3	667	82.5	84.2	84.2	84.2	-	1.7
5	667	82.5	84.2	87*	84.2	-	1.7
6	667	80.8	84.2	87*	84.2	-	3.4
Group B							
8	0	77.5	82.5	82.5	-	82.5	5.0
10	0	77.5	80.8	82.5	-	82.5	5.0
7	667	77.5	77.5	77.5	-	77.5	0
9	667	77.5	80.8	80.8	-	80.8	3.3

* Erroneous data because of procedural problems discovered after testing

TABLE 2
TEST SCHEDULE
1.6 L, 4-Cylinder Engine

Condition	Engine Speed rev/min	Engine Load BMEP	Time Minutes
1	2400	2.5 bar	20
2	3600	4 bar	20
3	3000	Full Load	5
4	2400	5.5 bar	20
5	1200	5.5 bar	20
6	1200	1.5 bar	20
7	850	Idle	15

Figure 2
Fuel Additive Tests
Octane Requirement Increase
Research Octane Number [RON]



10,000 km Road Tests — Laboratory L-6, a major European petroleum company, also ran some extended road tests on a car equipped with a 4-cylinder gasoline engine. These were four, 10,000 km tests run in series with a different fuel in each test. The combustion chamber was cleaned between tests. Octane requirement for each cylinder was determined from the spark advance producing borderline knock. The knock and octane requirement characteristics of this engine were very well known to this laboratory. Based on this experience, the ORI reductions by the additive that are shown in Table 3 were "considered to be very significant".

TABLE 3
OCTANE REQUIREMENT INCREASE*

	Untreated	Treated	ORI Reduction	Percent Reduction
Leaded Gas	4.6	0.8	3.8	82%
Unleaded Gas	1.5	0.3	1.2	80%

* Average Values of the 4-cylinders

GASOLINE ENGINE EMISSIONS — FTP Tests — Laboratory L-1 tested two pairs of 1986 cars using the 1975 Federal Test Procedure. Appendix B describes the work, summarizes the results and the statistical analyses. Table 4 presents the hydrocarbon and fuel economy results analyzed in terms of percent improvement when using the additive. Results are shown for the full three-bag FTP tests and for the hot transient (HT) third bag portion of the test.

Table 4 shows that additive use consistently reduces hydrocarbon emissions and increases fuel economy by the order of 5-15% and 1.5-2.5% , respectively. Results in Appendix B Table B-2 show that carbon monoxide and NOx emissions are not consistently nor, in most cases, significantly affected by additive use.

TABLE 4
EFFECT OF ADDITIVE ON
HYDROCARBON EMISSIONS AND FUEL ECONOMY
Two Car Pairs, 3 Replicates, 333 ppm**

HYDROCARBON EMISSIONS

	Percent Reduction from Untreated		
Additive Use	0 mi	500 mi	1000 mi
FTP			
Car Pair C		13.7 #	
Car Pair D	5.2 &	3.2	4.6
HT			
Car Pair C		16.1 #	
Car Pair D	10.0 @	11.4 #	14.3 &

FUEL ECONOMY
Carbon Balance

	Percent Increase from Untreated		
Additive Use	0 mi	500 mi	1000 mi
FTP			
Car Pair C		2.0 #	
Car Pair D	-0.1	1.5 #	1.4 #
HT			
Car Pair C		2.4 #	
Car Pair D	0.1	1.5 #	1.7 *

# $p < .01$ by two tail t-test
* $p < .05$ by two tail t-test
@ $p < .1$ by two tail t-test
& $p < .2$ by two tail t-test

**500 ppm used in one Pair D car after 500 miles FTP testing

Inspection-Type Emission Tests — In addition to the FTP testing, service-station, emission-control, inspection-type test data on hydrocarbon and carbon monoxide emissions were obtained on twenty-one cars. Additive concentrations were nominally 500 ppm and 1000 ppm. Data are tabulated in Appendix C and Table C-1. Duration of additive treatment varied from a flush through the fuel system by driving the car "around the block," to a more usual consumption of a full tank of treated fuel.

Table 5, summarizes the hydrocarbon emission results which show that the additive consistently reduced hydrocarbon emissions.

TABLE 5
EMISSION INSPECTION TEST SUMMARY

Concentration ppm	Number of Cars	HYDROCARBONS, % REDUCTION Minimum	Average	Maximum
500	16	10	62	100**
1000	5	2	70	100**

** 100% indicates additive reduced emissions below instrument detection limit.

1.6 L, 4-Cylinder Carburetted Engine — The emissions and fuel efficiency of the 1.6 L, 4-cylinder engine used in the ORI testing (Laboratory L-4) were also evaluated when the octane requirement was determined at 50 hour intervals. The data at equivalence ratios of 1.1, 1.0, 0.9 and 0.8 (13 to 18 A/F) with untreated and 424 ppm treated fuels are shown in Appendix D, Table D-1. Ignition timing was set at the minimum advance which gave best (highest) torque (MBT) at 40 Hz (2400 rpm) and 2.5 bar BMEP. Despite the fact that the engine was previously run-in for 20 hours over a range of speeds and loads, emissions and fuel efficiency evidenced an appreciable further break-in in the first 50 hours of the ORI test. Consequently, the Appendix Table D-1 and the following Table 6 summarize only the 50-200 hour steady state data.

TABLE 6
AVERAGE PERCENT DECREASE IN
FUEL CONSUMPTION AND EMISSIONS
424 ppm
1.6 L, 4-Cylinder Carburetted Engine
40 Hz, 2.5 Bar BMEP
MBT Timing, 50-200 Hour Average

Equivalence Ratio*	Fuel Consumption	HC	NOx	CO
1.1	0.3	-2.3**	15.9	-3.3
1.0	4.3	0.4	6.1	3.9
0.9	3.7	5.0	6.0	-3.3
0.8	1.2	-2.9	10.3	-1.5

* Equivalence ratio = $(A/F)_{stoich} / (A/F)$
** Negative decreases indicate increases

Table 6 shows that fuel consumption and NOx were both consistently reduced over the entire range of equivalence ratios. Hydrocarbon and carbon monoxide emissions both tend to be decreased near stoichiometric, but increased at the mixture extremes.

0.496 L Single-Cylinder Engine — Laboratory L-4 obtained additional emissions and fuel efficiency data in a 0.496 liter, single-cylinder engine, with a "bathtub" combustion chamber representative of many modern engine designs. The laboratory finds that the engine gives levels of performance representative of current gasoline engines. Data are given in Appendix D, Tables D-2 and D-3. Table 7 data cover a range of speeds and loads and treatment levels with MBT ignition-timing. Table 8 data are for five ignition settings with untreated fuel and fuel treated with 424 ppm. The 40 Hz and 2.5 bar BMEP condition for these tests was found to give the largest difference between treated and untreated fuel in spark advance for maximum torque.

TABLE 7
EFFECT OF OPERATING CONDITIONS ON PERCENT
DECREASE FROM UNTREATED FUEL
MBT Timing
0.496 L Single-Cylinder Engine
424 ppm, Stoichiometric A/F

Speed, Hz	BMEP, Bar	Fuel Consumption	HC	NOx	CO
40	2.5	-1.5	11.8	9.1	-1.7
40	5.5	0.1	2.0	-3.2	-0.1
20	5.5	0.4	1.9	5.6	-12.7
20	1.5	-0.3	7.9	-14.8	-0.5
15	0	-0.2	9.0	0.0	0.0

TABLE 8
TIMING EFFECT ON PERCENT DECREASE
IN FUEL CONSUMPTION AND EMISSIONS
0.496 L Single-Cylinder Engine
40 Hz, 2.5 bar BMEP
424 ppm, Stoichiometric A/F (14.5)

Timing, °BTDC	Fuel Consumption	HC	NOx	CO
25	2.4	4.7	7.0	3.0
30	1.6	14.0	5.1	13.2
35	-0.1	11.1	-0.3	-0.3
40	-1.3	6.0	-1.3	-26.7
45	-2.7	11.0	-8.8	-14.4

Table 7, with best torque ignition timing, indicates that 424 ppm treatment consistently decreases hydrocarbon emissions. Nitrogen oxide emissions may be either increased or decreased, depending on operating conditions. Carbon monoxide emissions are unaffected except at the high load of 5.5 bar at 20 Hz (1200 rpm). Data in the Appendix D, Table D-2 indicate that treatment with 848 ppm provides smaller and less consistent effects.

Increasing ignition advance is shown in Table 8 to have no systematic effect on percent decrease in hydrocarbon emissions. Fuel consumption, nitrogen oxide and carbon monoxide emissions increase when timing is advanced beyond the optimum for highest torque (about 35° BTDC for untreated fuel and 32° BTDC for treated fuel). Most engines have timing retarded from MBT to allow for manufacturing variations and to reduce exhaust emissions. With ignition retarded to 30° BTDC, Table 8 indicates that additive treatment would reduce fuel consumption by 1.6%, hydrocarbon emissions by 14%, NOx emissions by 5% and CO emissions by 13%.

FUEL ECONOMY — Significant improvements in fuel economy are realized with use of the additive in a variety of SI-engines with the engines tuned normally (i.e., not with gross variations in mixture ratio or spark-timing from manufacturer's recommendations). This is illustrated by the data shown in Figure 3. Tests are described in Appendix E, Table E-1.

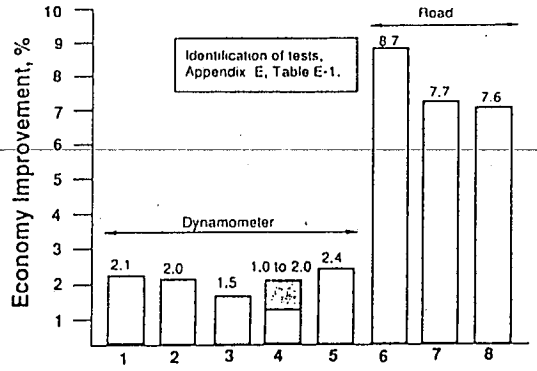
In Figure 3 the economy improvements for dynamometer evaluations 1 through 5 were obtained using engines which were relatively clean and/or had little accumulated mileage since manufacture or rebuilding. Conversely, the engines in 6, 7, and 8 were in over-the-road vehicles with considerable mileage. These would be expected to have deteriorated appreciably from a well-tuned state. The additive improved the fuel economy of the latter vehicles by significantly greater amounts than for the "nearly new" engines. Presumably, none of these engines had deteriorated sufficiently from normal mixture ratios or spark-timing to show the inconsistent effects illustrated in Table 5, 6, 7, and 8.

OCTANE NUMBER AND OCTANE RELATED ENGINE PERFORMANCE — The additive when incorporated in primary reference fuels and commercial gasoline has shown no significant effect on Research or Motor Octane Number, in limited testing by Laboratory L-2.

Laboratory L-4 measured octane number in the 0.496 L, single-cylinder engine used to obtain emissions and fuel economy data. Octane number at 1800 RPM and full-load was determined from the spark advance required to produce borderline knock. Additive concentrations of 424, 848 and 1700 ppm all produced borderline knock at 1 degree greater spark advance than for the untreated 91.5 RON gasoline. This corresponds to a 0.5 higher RON for the additive treated fuels.

Figure 3

Fuel Economy Improvement
With the Additive,
S.I. Engines



User reports suggest that in-service increases in effective octane number are greater than this slight increase.

VALVE SEAT RECESSION — Two exhaust valve seat recession tests were run by Laboratory L-4. The first was on a 1.2 L, European type, four cylinder, gasoline engine. The engine was run at wide-open throttle at a speed of 4500 rpm, for 55 hours. Every 5 hours the valve recession was measured. The cool-down time was kept constant to minimize temperature effects on these measurements.

Runs were made with untreated unleaded gasoline and with the gasoline trated with 848 and 424 ppm of the additive. The data are tabulated in Appendix Table F-1 and summarized in terms of average wear rates in Table 9. Untreated leaded gasoline data are also shown for comparison.

Data on the unleaded gasolines were analyzed by computation of the average recession rate for each valve for each five hour period. Paired untreated and treated recession rates for corresponding 5-hour time periods for each valve were examined statistically at both concentrations. Both the two-tailed binomial signs tests and the t-test indicate statistical significance at both concentrations ($p < 0.002$ and < 0.001, respectively at 424 ppm and $p < 0.008$ and < 0.01 at 848 ppm).

Table 9 averages indicate that additive treatment produces a 1.6 to 1.7-fold increase in average valve life and a 1.2-fold increase in worst valve life. It also indicates that leaded gasoline virtually eliminates wear.

TABLE 9
VALVE SEAT RECESSION RATES
1.2 L, 4-Cylinder

FUEL	NUMBER OF TESTS	AVERAGE VALVE μm/h	WORST VALVE μm/h
UNTREATED[1]	2	37.6	42.9
TREATED			
424 ppm(v)[1]	1	23.1	35.6
848 ppm(v)[2]	1	21.8	35.9
LEADED			
(150 mg/L)[1]	1	0.0	1.3

[1] 20-hr. test [2] 35-hr. test

An extensive series of valve recession tests, using unleaded gasoline, was also conducted by an engine manufacturer. These tests extended over a period of two years. The accumulated total running time on the engines reported here was 7108 hours, of which 4829 were run using the additive in the gasoline, and 2280 hours were run without.

The following engines were run both with and without the additive.

Engine Number	Configuration	Rated Power(kW)
1	4 cyl in-line	104
2	4 cyl in-line	142
3	V-8	194
4	V-8	205
5	V-6	153

All engines had induction-hardened valve seats.

The manufacturer used his standard durability test procedure, consisting of 55-minutes at full throttle and maximum load, followed by a 5-minutes idle period. The cycle was then repeated.

The tests were not formulated with paired tests of untreated and treated fuel or with frequent reference runs. Consequently, it is not possible to discount fluctuating variables of air/fuel ratio, fuel volatility, ambient test conditions, and the length of individual tests over the protracted period of testing. However, the data on 31 total tests in Appendix F, Table F-2 imply that the results were not influenced by such fluctuating variables. For comparative purposes, the manufacturer's raw data from the tests of different duration were analyzed by the authors and the author's conclusions were expressed as average wear rates over the test duration, even though it is known that rates vary with time during a test.

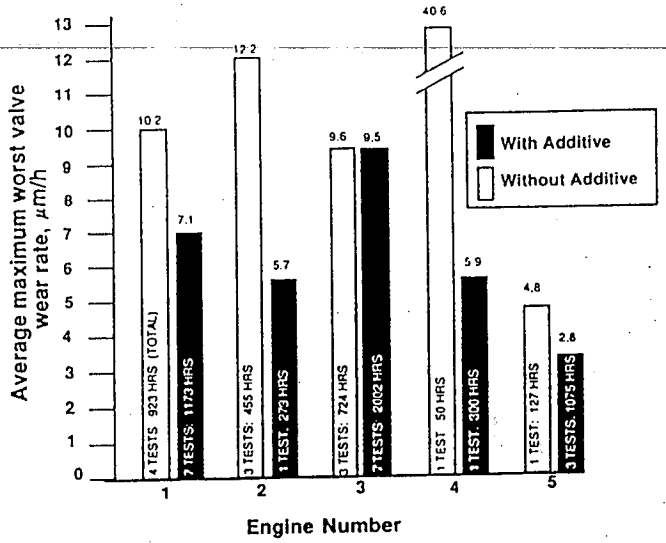
Nevertheless, the rather formidable collection of data, gathered over a prolonged period of time, through thousands of hours of testing, and with all of the variables present, does provide a consistent conclusion. The authors' conclusion from their analysis of the manufacturer's raw data is that valve seat wear rate reduction is significant when using the additive.

The data for each run are summarized in Appendix F, Table F-2 and average data for each engine model are in Table 10 and Figure 4. Data on any one engine model is too limited for statistical significance. However, combining the data from all five engines is adequate. The two-tailed t-test indicates that the mean recession rates are not the same with $p < 0.05$ and $p < 0.01$ for the worst valve and the average valve data, respectively. Thus, recession rates with treated fuel are significantly different from those with untreated fuel, provided that the usual assumptions for use of the t-test are satisfied.

Additional tests were run on six other engines using the additive. However, the engine manufacturer did not run comparative tests using untreated fuel. Therefore, although the data are available, they are not presented in this paper.

Figure 4

Four Cycle S.I. Engine
Valve Recession
Test Data



SUMMARY OF FLEET EXPERIENCES

Most of the foregoing text is based upon test results that characterize the behavior of the additive over short periods of time, under carefully controlled conditions.

The additive has also been evaluated for extended test periods, usually several years in duration, with a number of motor fleets. The nature of these data, although judged credible by the fleet manager, generally would not survive critical review and so are not tabulated in this paper. Highlights of these results from representative fleets, however, are included to demonstrate satisfactory field performance.

The types of fleets in which the additive was tested were 1) a large electric utility fleet of 654 vehicles, comprised of gasoline passenger cars and trucks, Diesel trucks, and miscellaneous machines; 2) a manufacturing plant fleet of approximately 1000 gasoline powered vehicles and 200 large Diesel trucks and construction vehicles; 3) a fleet of six police motorcycles; and 4), a utility which tested the additive in two aircraft-type, stationary gas

TABLE 10
AVERAGE VALVE SEAT RECESSION RATES
FOR EACH ENGINE MODEL
556 & 1000 ppm Treatment

Engine Number	Worst Valve, μm/h		Average Valve, μm/h		Total Test Hours	
	Untreated	Treated	Untreated	Treated	Untreated	Treated
1	10.2	7.1	4.4	3.1	923	1173
2	12.2	5.7	6.9	4.8	455	279
3	9.6	9.5	3.7	4.1	724	2002
4	40.6	5.9	8.1	1.4	50	300
5	4.8	2.8	3.2	1.3	127	1075
Mean*	12.61	7.19	5.07	3.18		

* Mean calculated from average rate before rounding.

turbines. About five years of experience with the additive has been accumulated by the utility and plant fleets, and three years by the motorcycle fleet and gas turbines without observation of any adverse treatment effects.

The utility fleet reported that a troublesome valve burning problem had been eliminated by use of the additive, and that knocking and pinging problems also had been eliminated. They have treated in excess of 9,100 m^3 (2,400,000 gallons) of fuel with the additive.

Both fleets 1 and 2 noted improvements in fuel economy. Moreover, they together with fleet 3 were able to switch from 89 octane leaded gasoline to 87 octane unleaded without adverse effects.

A six-month comparative test was run with the motorcycle fleet. Three motorcycles used a base fuel; three used the same fuel but treated with the additive. Qualitative evaluations indicated both better throttle response and reductions in knock and pinging. The knock/pinging reduction is supported by Figure 5 which shows much smaller amounts of piston top deposits associated with use of the additive.

Lastly, in the gas turbine group 4, a 1% reduction in fuel consumption was noted.

ADDITIVE CONCENTRATION

At present, additive concentration has not been systematically investigated. However, consideration of the several concentrations tested for the various types of performance suggests an approximate optimum for gasoline to be in the vicinity of 500 ppm (i.e., between 300-700 ppm).

DISCUSSION

The additive performance suggests that it acts as a combustion modifier in engines. Further support for combustion modification is suggested by SI-engine work at Laboratory L-4. The single-cylinder 0.496 L engine and the 4-cylinder 1.6 L engine emission data were both obtained with ignition timing set to the minimum value giving the highest torque. Generally, the timing for the additive treated fuels was 1 to 3 or 4° BTDC less advanced than the untreated fuel (usually 1 to 2°). This is consistent with expectations if the additive treated fuels ignite and/or burn faster than untreated fuel.

More direct confirmation of combustion effects has been obtained by Laboratory L-4. Pressure signature data were obtained on the 0.496 L, single-cylinder SI-engine for which data are shown in Table 7 and on a 1.6 L IDI CI-engine. The pressure signature data were analyzed in terms of energy release. Results on the SI-engine show that the delay from ignition to 10% energy release and the time for 10% to 50% energy release are reduced, while peak pressure generally is not changed. Results in the IDI CI-engine similarly show that the ignition delay and the time to release 10-to-90% of the heat are both reduced. These SI- and CI-engine results will be detailed in a separate paper.

CONCLUSIONS

The results reported above show that the additive treats a broad spectrum of important gasoline related problems. The additive at 333-848 ppm:

1. Reduces the need for higher (R + M)/2 octane fuel by reducing octane requirement increase by about 70%.
2. Reduces exhaust hydrocarbon emissions by the order of 10% or more.
3. Reduces fuel consumption, by about 1.5% and often much more.
4. Reduces valve seat recession.

These additive effects appear to be the result of combustion modification.

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REFERENCES

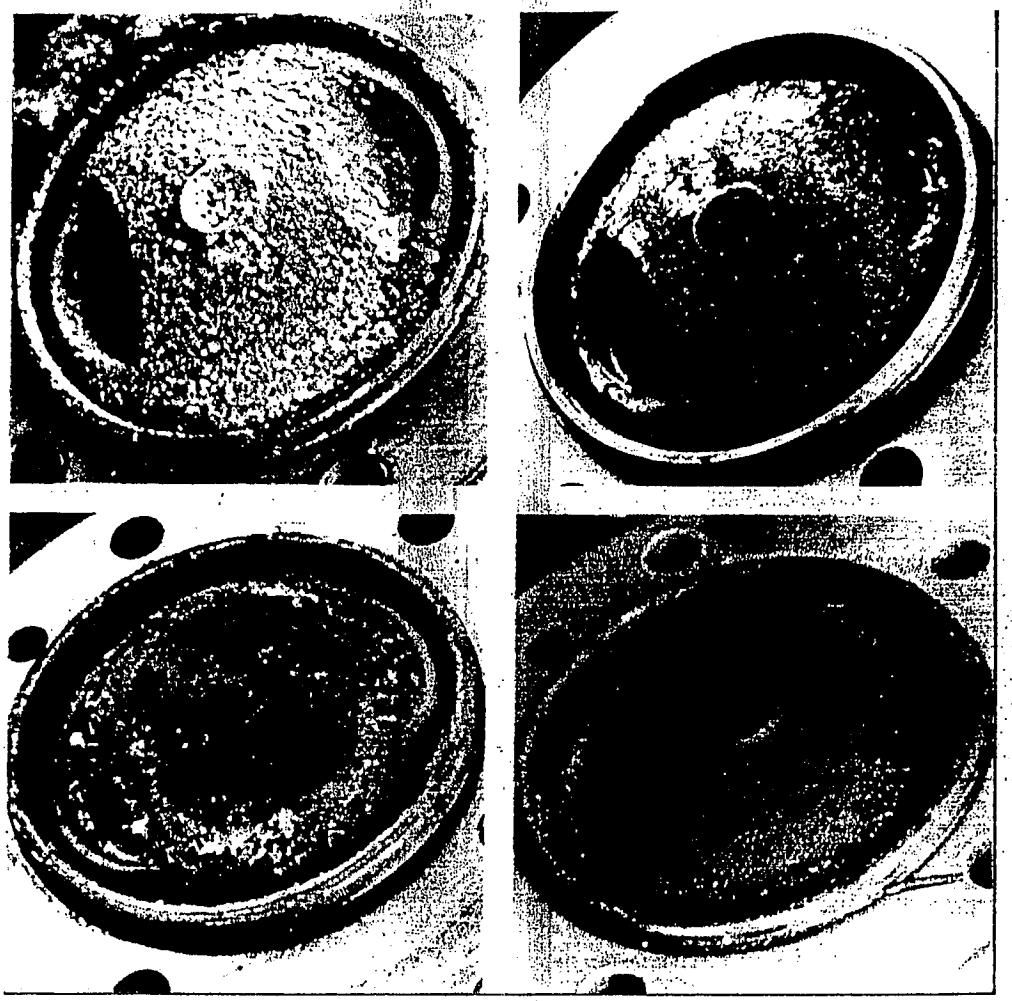
[1] Federal Register, Volume 46, Number 144, Tuesday, July 28, 1981, Page 38584. Fuels and Fuel Additives: Revised Definition of "Substantially Similar".

Figure 5

Motorcycle Engine Piston Deposits
Rear Piston Tops

Engine A

Engine B



(Top) Deposits accumulated with 89 octane leaded gasoline

(Bottom) 3500 miles following conversion to 87 octane untreated unleaded gasoline.

(Bottom) 3500 miles following conversion to 87 octane treated unleaded gasoline.

APPENDIX A
LABORATORY KEY

APPENDIX B
PASSENGER CAR EMISSIONS - FEDERAL TEST PROCEDURE

Experimental Procedure — Two pairs of 1986 passenger cars were tested for exhaust emissions. Cars in each pair were of the same make and model. Testing was carried out by EPA approved laboratory, L-1, using the 1975 Federal Test Procedure. A MINI CVS sample was used to obtain exhaust gas samples prior to the catalytic converter. Indolene was used as the base fuel untreated and treated with the Additive. Additive concentration was 333 ppm(v) with one exception noted below.

Car pair C had 2.5 litre 4-cylinder engines with throttle-body fuel injection (TBFI). Four replicate tests were made with the untreated base fuel and triplicate tests with the Additive treated fuel after 500 miles accumulation with treated fuel. Car C1 began the testing with 5745 miles on the odometer and car C2 began with 2578 miles.

Car pair D had 4.1 litre V-8 engines with port fuel injection (PFI) and automatic transmissions. Triplicate FTP emissions tests with untreated indolene were followed by tests after 0, 500 and 1000 miles accumulation with Additive treated indolene. Accumulation between 500 and 1000 miles and 1000-mile testing with one of the cars was with an Additive concentration of 333 ppm. Car D1 began the testing with 6883 odometer miles and car D2 began with 3366 miles.

Mileage accumulation was carried out on a computerized chassis dynamometer. On the dynamometer, the driver followed a computer-prescribed road course consisting of about 20% city/suburban street and 80% highway driving.

Means and standard deviations of the replicate tests are in Table B-1. The data for the hot transient portion of the FTP test are shown along with data for the full cold-start FTP test.

Data Analysis Procedure — Data were examined for the normality assumed by standard parametric statistical tests. The distribution about the mean of the replicates was plotted as the ratio of the deviation from mean to the standard deviation on probability coordinates. The individual car data were non-normal as evidenced by essentially no data more than about 1.5 standard deviations from the mean.

Data normalization was accomplished by grouping the Pair C cars together and the Pair D cars together and then taking the difference between paired data for two test conditions. Data were paired according to the sequence of replicates for each test condition. This required discarding one of the four base fuel replicates for each of the Pair C cars; the first replicate was arbitrarily selected.

Pair D data at 1000 miles with two different Additive concentrations (333 ppm in one car and 500 ppm in the other car) for the last 500 miles were combined since there was no significant concentration effect.

The normalization procedure yielded means and standard deviations of the difference between tests with Additive at some mileage and tests with the base fuel or Additive at a different mileage. Student t's were calculated from each mean and standard deviation. t was used to test the null hypothesis that there was no difference between the results from the paired tests (i.e. the average difference is zero). Fuel economy from the carbon balance showed no significant difference between the MINI and emission data. Hence, MINI data were treated as additional replicates.

RESULTS

Table B-2 shows statistics for the effect of Additive treatment on hydrocarbons, carbon monoxide and nitrogen oxides measured in the tailpipe emissions and in the burned gases prior to the catalyst. It also summarizes the analysis of the carbon balance data. Results are shown as the mean difference, standard deviation of the mean, t for the comparison of the mean with zero, and probability p that t differs from zero by at least the absolute value of t.

The 500 miles on treated fuel minus the base fuel for both car pairs and the 1000 miles minus 0 miles on treated fuel for car Pair D are comparisons of independent data. The 0, 500 and 1000 mile minus base fuel comparisons use the same untreated base fuel data and, thus, are not fully independent.

APPENDIX B
Table B-1
A. HYDROCARBON DATA

CAR	FTP EMISSIONS, g/mile				
	Base	333 ppm 0 mi	333 ppm 500 mi	333 ppm 1000 mi	500 ppm 1000 mi
C1					
mean	0.253		0.202		
std dev	0.026		0.015		
replicates	4		3		
C2					
mean	0.201		0.160		
std dev	0.041		0.007		
replicates	4		3		
D1					
mean	0.137	0.135	0.139	0.143	
std dev	0.007	0.011	0.007	0.009	
replicates	3	3	3		
D2					
mean	0.170	0.156	0.158		0.150
std dev	0.008	0.005	0.004		0.004
replicates	3	3	3		3

	HOT TRANSIENT EMISSIONS, g/mile				
	Base	333 ppm 0 mi	333 ppm 500 mi	333 ppm 1000 mi	500 ppm 1000 mi
C1					
mean	0.136		0.098		
std dev	0.041		0.027		
replicates	4		4		
C2					
mean	0.100		0.060		
std dev	0.050		0.009		
replicates	4		3		
D1					
mean	0.068	0.067	0.063	0.068	
std dev	0.005	0.010	0.003	0.007	
relicates	3	3	3	3	
D2					
mean	0.092	0.078	0.079		0.069
std dev	0.005	0.001	0.003		0.002
replicates	3	3	3		3

CAR	MINI FTP, g/mile				
	FTP Base	333 ppm 0 mi	333 ppm 500 mi	333 ppm 1000 mi	500 ppm 1000 mi
C1					
mean	1.908		1.743		
std dev	0.125		0.025		
replicates	4		3		
C2					
mean	1.843		1.728		
std dev	0.110		0.024		
replicates	4		3		
D1					
mean	3.085	3.006	3.030	2.973	
std dev	0.038	0.059	0.110	0.107	
replicates	3	3	3	3	
D2					
mean	3.133	3.063	3.086		3.106
std dev	0.084	0.029	0.060		0.094
replicates	3	3	3		3

MINI HOT TRANSIENT, g/mile

	Base	333 ppm 0 mi	333 ppm 500 mi	333 ppm 1000 mi	500 ppm 1000 mi
C1					
mean	1.855		1.702		
std dev	0.138		0.029		
replicates	4		3		
C2					
mean	1.789		1.671		
std dev	0.098		0.029		
replicates	4		3		
D1					
mean	2.984	2.897	2.953	2.890	
std dev	0.025	0.058	0.062	0.080	
replicates	3	3	3	3	
D2					
mean	3.037	2.979	2.999		2.995
std dev	0.067	0.060	0.070		0.097
replicates	3	3	3		3

B. CARBON MONOXIDE DATA

CAR — FTP EMISSIONS, g/mile

	Base	333 ppm 0 mi	333 ppm 500 mi	333 ppm 1000 mi	500 ppm 1000 mi
C1					
mean	1.321		1.310		
std dev	0.200		0.213		
replicates	4		3		
C2					
mean	1.316		1.338		
std dev	0.138		0.060		
replicates	4		3		
D1					
mean	1.165	1.239	1.437	1.326	
std dev	0.099	0.053	0.161	0.156	
replicates	3	3	3	3	
D2					
mean	1.374	1.337	1.318		1.254
std dev	0.164	0.125	0.062		0.071
replicates	3	3	3		3

CAR — HOT TRANSIENT EMISSIONS, g/mile

	Base	333 ppm 0 mi	333 ppm 500 mi	333 ppm 1000 mi	500 ppm 1000 mi
C1					
mean	1.196		1.123		
std dev	0.273		0.137		
replicates	4		3		
C2					
mean	0.925		0.773		
std dev	0.203		0.114		
replicates	4		3		
D1					
mean	0.102	0.137	0.130	0.142	
std dev	0.005	0.033	0.019	0.053	
replicates	3	3	3	3	
D2					
mean	0.298	0.225	0.137		0.127
std dev	0.289	0.111	0.009		0.029
replicates	3	3	3		3

MINI FTP, g/mile

	Base	333 ppm 0 mi	333 ppm 500 mi	333 ppm 1000 mi	500 ppm 1000 mi
C1					
mean	6.650		6.908		
std dev	0.258		0.309		
replicates	4		3		
C2					
mean	8.678		9.225		
std dev	0.505		0.295		
replicates	4		3		
D1					
mean	12.680	12.771	13.469	13.386	
std dev	0.145	0.326	1.491	0.722	
replicates	3	3	3	3	
D2					
mean	14.766	15.709	14.773		14.618
std dev	0.786	0.561	0.142		0.700
replicates	3	3	3		3

MINI HOT TRANSIENT, g/mile

	Base	333 ppm 0 mi	333 ppm 500 mi	333 ppm 1000 mi	500 ppm 1000 mi
C1					
mean	6.534		6.755		
std dev	0.211		0.249		
replicates	4		3		
C2					
mean	8.196		8.376		
std dev	0.490		0.104		
replicates	4		3		
D1					
mean	11.206	10.829	11.932	11.630	
std dev	0.045	0.547	0.302	0.754	
replicates	3	3	3	3	
D2					
mean	14.083	14.699	12.768		12.674
std dev	1.172	1.070	0.142		0.330
replicates	3	3	3		3

C. NITROGEN OXIDES DATA SUMMARY

CAR — FTP EMISSIONS, g/mile

	Base	333 ppm 0 mi	333 ppm 500 mi	333 ppm 1000 mi	500 ppm 1000 mi
C1					
mean	0.240		0.249		
std dev	0.011		0.025		
replicates	4		3		
C2					
mean	0.177		0.185		
std dev	0.012		0.011		
replicates	4		3		
D1					
mean	0.561	0.550	0.536	0.562	
std dev	0.038	0.014	0.045	0.017	
replicates	3	3	3	3	
D2					
mean	0.609	0.604	0.605		0.620
std dev	0.029	0.013	0.014		0.034
replicates	3	3	3		3

CAR — HOT TRANSIENT EMISSIONS, g/mile

	Base	333 ppm 0 mi	333 ppm 500 mi	333 ppm 1000 mi	500 ppm 1000 mi
C1					
mean	0.137		0.148		
std dev	0.016		0.023		
replicates	4		3		
C2					
mean	0.112		0.118		
std dev	0.012		0.015		
replicates	4		3		
D1					
mean	0.425	0.419	0.382	0.391	
std dev	0.019	0.018	0.026	0.042	
replicates	3	3	3	3	
D2					
mean	0.440	0.415	0.436		0.465
std dev	0.044	0.017	0.009		0.032
replicates	3	3	3		3

MINI FTP, g/mile

	Base	333 ppm 0 mi	333 ppm 500 mi	333 ppm 1000 mi	500 ppm 1000 mi
C1					
mean	1.983		1.887		
std dev	0.089		0.080		
replicates	4		3		
C2					
mean	1.906		1.833		
std dev	0.044		0.038		
replicates	4		3		
D1					
mean	1.303	1.262	1.214	1.277	
std dev	0.066	0.015	0.073	0.027	
replicates	3	3	3	3	
D2					
mean	1.430	1.414	1.435		1.466
std dev	0.020	0.017	0.019		0.019
replicates	3	3	3		3

MINI HOT TRANSIENT, g/mile

	Base	333 ppm 0 mi	333 ppm 500 mi	333 ppm 1000 mi	500 ppm 1000 mi
C1					
mean	1.865		1.784		
std dev	0.116		0.091		
replicates	4		3		
C2					
mean	1.835		1.781		
std dev	0.045		0.031		
replicates					
D1					
mean	1.203	1.167	1.129	1.142	
std dev	0.047	0.039	0.057	0.036	
replicates	3	3	3	3	
D2					
mean	1.270	1.258	1.285		1.320
std dev	0.020	0.025	0.022		0.022
replicates	3	3	3		3

D. CARBON BALANCE DATA SUMMARY
EMISSIONS & MINI COMBINED

CAR — FTP, miles/gallon

	Base	333 ppm 0 mi	333 ppm 500 mi	333 ppm 1000 mi	500 ppm 1000 mi
C1					
mean	22.74		23.26		
std dev	0.21		0.05		
replicates	8		6		
C2					
mean	22.64		22.93		
std dev	0.04		0.07		
replicates	8		6		
	17.64	18.46	18.14	18.00	
	17.93	17.76	18.16	17.99	
	18.16	17.69	17.98	18.51	
	17.74	18.59	18.24	18.06	
	18.00	17.79	18.89	18.06	
	18.26	17.71	18.05	18.62	
D1					
mean	17.96	18.00	18.24	18.21	
std dev	0.24	0.41	0.33	0.28	
replicates	6	6	6	6	
D2					
mean	18.00	17.93	18.25		18.24
std dev	0.10	0.23	0.25		0.23
replicates	6	6	6		6

CAR — HT HOT TRANSIENT, miles/gallon

	Base	333 ppm 0 mi	333 ppm 500 mi	333 ppm 1000 mi	500 ppm 1000 mi
C1					
mean	23.45		24.05		
std dev	0.19		0.14		
replicates	8		6		
C2					
mean	23.41		23.84		
std dev	0.08		0.04		
replicates	8		6		
D1					
mean	18.51	18.63	18.78	18.83	
std dev	0.20	0.42	0.10	0.30	
replicates	6	6	6	6	
D2					
mean	18.57	18.50	18.85		18.87
std dev	0.09	0.19	0.22		0.26
replicates	6	6	6		6

APPENDIX B
Table B-2
A. HYDROCARBONS
grams/mile Decrease

500 miles on Additive minus Base Fuel

			Mean	Std Dev	t	5 df Two-Tail p
Pair C						
	Emissions	HT	0.019	0.017	2.747	<.05
		FTP	0.031	0.017	4.575	<.01
	MINI	HT	0.111	0.101	2.705	<.05
		FTP	0.116	0.105	2.704	<.05
Pair D						
	Emissions	HT	0.009	0.006	4.035	<.01
		FTP	0.005	0.013	0.903	<.5
	MINI	HT	0.035	0.057	1.477	<.2
		FTP	0.051	0.077	1.632	<.2

1000 miles on Additive minus 0 miles on Additive

						5 df Two-Tail p
Pair D						
	Emissions	HT	0.038	0.045	2.090	<.1
		FTP	-0.001	0.015	0.169	>.8
	MINI	HT	-0.005	0.129	0.089	>.8
		FTP	-0.005	0.137	0.084	>.8

	Additive miles	Mean	Std Dev	t	5 df Two-Tail p
Pair D					
HT					
Emissions	0	0.008	0.008	2.398	<.1
	500	0.009	0.006	4.035	<.01
	1000	0.012	0.015	1.924	<.2
	FTP				
	0	0.008	0.011	1.858	<.2
	500	0.005	0.013	0.903	<.5
	1000	0.007	0.017	0.997	<.4
	HT				
MINI	0	0.073	0.029	6.172	<.01
	500	0.035	0.057	1.477	<.2
	1000	0.068	0.120	1.384	<.3
	FTP				
	0	0.074	0.042	4.291	<.01
	500	0.051	0.077	1.632	<.2
	1000	0.069	0.150	1.137	<.4

Table B-2
B. CARBON MONOXIDE
grams/mile Decrease

500 miles on Additive minus Base Fuel

			Mean	Std Dev	t	5 df Two-Tail p
Pair C						
	Emissions	HT	0.017	0.193	0.212	>.8
		FTP	-0.080	0.205	-0.960	<.2
	MINI	HT	-0.061	0.215	-0.697	<.4
		FTP	-0.231	0.252	-2.245	<.1
Pair D						
	Emissions	HT	0.067	0.215	0.760	<.6
		FTP	-0.108	0.274	-0.965	<.2
	MINI	HT	0.294	1.373	0.525	<.8
		FTP	-0.398	1.188	-0.820	<.6

1000 miles on Additive minus 0 miles on Additive

						5 df Two-Tail p
Pair D						
	Emissions	HT	0.047	0.102	1.124	<.4
		FTP	-0.002	0.134	-0.037	>.8
	MINI	HT	0.612	1.955	0.767	<.4
		FTP	0.238	1.332	0.437	<.6

	Additive miles	Mean	Std Dev	t	5 df Two-Tail p
Pair D					
HT					
Emissions	HT				
	0	0.020	0.255	0.187	>.8
	500	0.067	0.215	0.760	<.5
	1000	0.066	0.231	0.701	<.6
	FTP				
	0	-0.019	0.189	-0.239	>.8
	500	-0.108	0.274	-0.965	<.5
	1000	-0.021	0.232	-0.216	>.8
	HT				
MINI					
	0	-0.120	1.454	-0.202	>.8
	500	0.294	1.373	0.525	<.8
	1000	0.492	1.284	0.939	<.4
	FTP				
	0	-0.517	0.909	-1.392	<.3
	500	-0.398	1.188	-0.820	<.5
	1000	-0.279	0.638	-1.070	<.4

Table B-2
C. NITROGEN OXIDES
grams/mile Decrease
500 miles on Additive minus Base Fuel

			Mean	Std Dev	t	5 df Two-Tail p
Pair C						
	Emissions	HT	-0.006	0.021	-0.696	<.6
		FTP	-0.010	0.014	-1.737	<.2
	MINI	HT	0.102	0.099	2.531	<.1
		FTP	0.113	0.085	3.240	<.05
Pair D						
	Emissions	HT	0.023	0.046	1.239	<.4
		FTP	0.014	0.048	0.721	<.6
	MINI	HT	0.029	0.077	0.944	<.4
		FTP	0.042	0.103	1.002	<.4

1000 miles on Additive minus 0 miles on Additive

Pair D						
	Emissions	HT	-0.011	0.064	-0.420	<.8
		FTP	-0.014	0.028	-1.206	<.4
	MINI	HT	-0.018	0.067	-0.668	<.6
		FTP	-0.034	0.026	-3.117	<.05

Pair D					5 df Two-Tail
	Additive				
HT	miles	Mean	Std Dev	t	p
Emissions					
	0	0.015	0.046	0.822	<.5
	500	0.023	0.046	1.239	<.3
	1000	0.004	0.037	0.288	<.8
	FTP				
	0	0.008	0.040	0.475	<.8
	500	0.014	0.048	0.721	<.6
	1000	-0.006	0.020	-0.765	<.4
	HT				
MINI					
	0	0.024	0.057	1.023	<.4
	500	0.029	0.077	0.944	<.4
	1000	0.005	0.063	0.214	>.8
	FTP				
	0	0.029	0.052	1.348	<.3
	500	0.042	0.103	1.002	<.4
	1000	-0.005	0.066	-0.179	>.8

APPENDIX B
Table B-2
D. CARBON BALANCE miles per gallon Increase
Base Fuel minus 500 miles on Additive

				11 df Two-Tail
	Mean	Std Dev	t	p
Pair C				
	HT	0.556	0.186	10.354	<.01
	FTP	0.450	0.087	18.004	<.01
Pair D				
	HT	0.272	0.270	2.471	<.05
	FTP	0.267	0.368	1.777	<.2

0 miles on Additive minus 1000 miles Additive

Pair D				
HT	0.289	0.484	1.463	<.2
FTP	0.261	0.464	1.377	<.2

Pair D				11 df Two-Tail
	Additive			
HT	miles	Mean	Std Dev	t	p
	0	0.020	0.463	0.150	>.8
	500	0.272	0.270	3.495	<.01
	1000	0.309	0.463	2.311	<.05
	FTP				
	0	-0.014	0.479	-0.102	>.8
	500	0.267	0.368	2.508	<.05
	1000	0.247	0.173	4.945	<.01

APPENDIX B
Table B-3
ADDITIVE EFFECT ON HYDROCARBON OXIDATION EFFICIENCY
Percent Catalyst Efficiency Increase

	500 miles - Base			5 df Two-Tail
	Mean	Std Dev	t	p
Pair C				
HT	0.17	1.22	0.334	<.6
FTP	0.98	0.64	3.775	<.02
Pair D				
HT	0.27	0.18	3.780	<.02
FTP	0.07	0.35	0.520	<.8

1000 miles minus 0 miles

HT	0.12	0.46	0.643	<.6
FTP	0.11	0.71	0.369	<.8

Pair D		Additive miles	Mean	Std Dev	t	p
	HT	0	0.20	0.29	1.736	<.2
		500	0.27	0.18	3.780	<.02
		1000	0.32	0.54	1.467	<.4
	FTP					
		0	0.14	0.31	1.114	<.4
		500	0.07	0.35	0.520	<.8
		1000	0.11	0.71	0.369	<.8

APPENDIX B
Table B-4
SUMMARY OF FEDERAL TEST PROCEDURE
ADDITIVE EFFECT
Percetage Change

HYDROCARBON EMISSIONS

	Percent Reduction from Base		
	0 mi	500 mi	1000 mi
FTP			
Pair C		13.7 #	
Pair D	5.2 &	3.2	4.6
HT			
Pair C		16.1 *	
Pair D	10.0 @	11.4 #	14.3 &

CARBON MONOXIDE EMISSIONS

	Percent Reduction from Base		
	0 mi	500 mi	1000 mi
FTP			
Pair C		-6.1 &	
Pair D	-1.5	-8.5	-1.6
HT			
Pair C		1.6	
Pair D	9.7	33.3	33.0

NITROGEN OXIDE EMISSIONS

	Percent Reduction from Base		
	0 mi	500 mi	1000 mi
FTP			
Pair C		-4.8 &	
Pair D	1.3	2.4	-1.1
HT			
Pair C		-4.8	
Pair D	3.5	5.4	1.0

# p < .01
* p < .05
@ p < .1
& p < .2

APPENDIX B
Table B-4
SUMMARY OF FEDERAL TEST PROCEDURE
ADDITIVE EFFECT
Percent Change

CARBON BALANCE

	Percent Increase from Base		
	0 mi	500 mi	1000 mi
FTP			
Pair C		2.0 #	
Pair D	-0.1	1.5 *	1.4 #
HT			
Pair C		2.4 #	
Pair D	0.1	1.5 #	1.7 *

MINI HYDROCARBONS

	Percent Reduction from Base		
	0 mi	500 mi	1000 mi
FTP			
Pair C		6.2 *	
Pair D	2.4 #	1.6 &	2.2
HT			
Pair C		6.1 #	
Pair D	2.4 #	1.1 &	2.3

# p < .01
* p < .05
@ p < .1
& p < .2

Table B-4
SUMMARY OF FEDERAL TEST PROCEDURE
ADDITIVE EFFECT
Percentage Change

MINI CARBON MONOXIDE

	Percent Reduction from Base		
	0 mi	500 mi	1000 mi
FTP			
Pair C		-3.0 &	
Pair D	-3.8	-2.9	-2.0
HT			
Pair C		0.2	
Pair D	-0.9	2.3	3.9

MINI NITROGEN OXIDES

	Percent Reduction from Base		
	0 mi	500 mi	1000 mi
FTP			
Pair C		5.8 *	
Pair D	2.1	3.1	-0.4
HT			
Pair C		5.5 @	
Pair D	1.9	2.4	0.4

# p < .01
* p < .05
@ p < .1
& p < .2

APPENDIX C
Table C-1
A. Hydrocarbons
INSPECTION-TYPE EMISSION DATA

Car	Conditions	Untreated ppm	Treated ppm	ppm Reduction	% Reduction
1000 ppm(v) Treatment					
71 FP	55 mph, 10 BHP	57	4	53	93
	30 mph, 20 BHP	55	8	47	85
75 FI	55 mph, 10 BHP	6	0	6	100
	30 mph, 20 BHP	22	0	22	100
78 PC	55 mph, 20 BHP	98	96	2	2
	30 mph, 15 BHP	132	126	6	5
80 GC	55 mph, 30 BHP	24	12	12	50
	30 mph, 40 BHP	18	4	14	78
80 PS	55 mph, 10 BHP	26	2	24	92
	30 mph, 20 BHP	69	6	63	91
Mean		51	26	25	70
Max		132	126	63	100
Min		6	0	2	2
500 ppm(v) Treatment					
86 GS	High rpm	39	8	31	79
	Low rpm	42	23	19	45
75 OD	High rpm	137	64	73	53
	Low rpm	1202	509	693	58
84 OF	High	24	13	11	46
	Low	23	13	10	43
85 PC	High	76	24	52	68
	Low	84	44	40	48
83 CC	High	47	0	47	100
	Low	21	0	21	100
77 CT	High	37	18	19	51
	Low	219	198	21	10
81 PC	High	42	19	23	55
	Low	34	19	15	44
83 PC		78	16	62	79
87 FT		30	14	16	53
83 OE		95	3	92	97
86 VO-1		116	0	116	100
79 FD		531	415	116	22
85 BK		142	100	42	30
83 OE		95	3	92	97
86 VO-2		116	0	116	100
87 FD		30	14	16	53
Mean		142	66	76	62
Max		1202	509	693	100
Min		21	0	10	10
All Data					
Mean		110	54	60	64
Median		55	13	24	58
Max		1202	509	693	100
Min		6	0	2	2

B. Carbon Monoxide

Car	Conditions	Untreated %	Treated %	Reduction % CO	Reduction
1000 ppm(v) Treatment					
71 FP	55 mph, 10 BHP	0.29	0.30	-0.01	-3
	30 mph, 20 BHP	0.30	0.17	0.13	43
75 FI	55 mph, 10 BHP	0.73	0.7	0.03	4
	30 mph, 20 BHP	1.09	1.08	0.01	1
78 PC	55 mph, 20 BHP	0.09	0.06	0.03	33
	30 mph, 15 BHP	0.10	0.10	0.00	0
80 GC	55 mph, 30 BHP	0.02	0.01		
	30 mph, 40 BHP	0.04	0.04	0.00	0
80 PS	55 mph, 10 BHP	0.03	0.06		
	30 mph, 20 BHP	0.03	0.03		
Mean		0.27	0.26	0.03	11
Max		1.09	1.08	0.13	43
Min		0.02	0.01	-0.01	-3
500 ppm(v) Treatment					
86 GS	High rpm	0.01	0.01		
	Low rpm	0.01	0.01		
75 OD	High rpm	2.08	1.35	0.73	35
	Low rpm	8.83	5.91	2.92	33
84 OF	High	0.15	0.02	0.13	87
	Low	0.09	0.01	0.08	89
85 PC	High	0.18	0.03	0.15	83
	Low	0.05	0.03	0.02	40
83 CC	High	0.01	0.00		
	Low	0.00	0.00		
77 CT	High	0.27	0.16	0.11	41
	Low	6.05	5.79	0.26	4
81 PC	High	0.57	0.01	0.56	98
	Low	0.05	0.01	0.04	80
83 PC 4-cyl		16.60	15.20	1.40	8
87 FT		0.01	0.01		
83 OE		0.13	0.00	0.13	100
86 VO-1		0.20	0.00	0.20	100
79 FD		6.05	4.37	1.68	28
85 BK		0.14	0.14	0.00	0
83 OE		0.13	0.00	0.13	100
86 VO-2		0.20	0.00	0.20	100
87 FD		0.01	0.01		
Mean		1.82	1.44	0.51	60
Max		16.6	15.2	2.92	100
Min		0	0	0	0
All Data					
Mean		1.28	1.03	0.27	36
Median		0.13	0.03	0.03	33
Max		16.6	15.2	2.92	100
Min		0	0	-0.03	-3

APPENDIX D
Table D-1
SUMMARY OF 50 to 200-HOUR TEST DATA AFTER BREAK-IN
1.6 L, 4-Cylinder Carburetted Engine
40 Hz (2400 rpm), 2.5 bar BMEP
Ignition timing for Maximum Torque

	Equiv. Ratio	Fuel* g/kW.h	HC g/kW.h	NOx g/kW.h	CO g/kW.h	HC + NOx g/kW.h	Ignition Timing °BTDC	Exhaust Temp °C
0 ppm(m)								
Mean	1.107	447.3	8.073	12.254	178.260	20.326	32	477.8
Std. Dev.	0.009	12.6	0.611	0.542	14.087	0.843	0	6.7
500 ppm(m)								
Mean	1.108	446.1	8.259	10.300	184.222	18.559	31	460.0
Std. Dev.	0.004	1.2	0.297	0.312	2.136	0.128	0	5.2
0 ppm(m)								
Mean	0.994	410.6	6.182	20.327	26.958	26.510	34	501.5
Std. Dev.	0.003	1.3	0.970	1.935	0.279	2.882	0	6.7
500 ppm(m)								
Mean	0.995	393.1	6.156	19.089	25.916	25.246	33	485.5
Std. Dev.	0.002	2.0	0.160	1.977	0.098	1.899	0	4.1
0 ppm(m)								
Mean	0.896	397.4	5.584	20.456	4.704	26.040	36	496.3
Std. Dev.	0.004	6.1	0.751	1.469	0.087	2.156	1	9.3
500 ppm(m)								
Mean	0.895	382.7	5.306	19.228	4.859	24.534	36	478.5
Std. Dev.	0.002	1.9	0.146	1.927	0.491	1.975	1	2.6
0 ppm(m)								
Mean	0.810	420.3	6.490	11.204	5.474	17.694	40	494.3
Std. Dev.	0.003	4.6	0.992	2.224	0.105	3.196	0	7.1
500 ppm(m)								
Mean	0.800	415.4	6.677	10.051	5.558	16.727	39	483.0
Std. Dev.	0.003	6.7	0.320	1.463	0.632	1.438	0	1.6

Mean Equiv. Ratio	DECREASE FROM UNTREATED FUEL: Fuel* g/kW.h	HC g/kW.h	NOx g/kW.h	CO g/kW.h	HC + NOx g/kW.h	Timing °BTDC	Temp °C
1.107	1.25	-0.186	1.954	-5.962	1.768	1	17.8
%	0.3	-2.3	15.9	-3.3	8.7	3.1	3.7
0.995	17.5	0.026	1.238	1.043	1.264	1	16.0
%	4.3	0.4	6.1	3.9	4.8	2.9	3.2
0.895	14.7	0.279	1.228	-0.155	1.506	0.0	17.8
%	3.7	5.0	6.0	-3.3	5.8	0.0	3.6
0.805	4.8	-0.186	1.153	-0.084	0.967	1	11.3
%	1.2	-2.9	10.3	-1.5	5.5	2.5	2.3

APPENDIX D
Table D-2
EFFECTS OF OPERATING CONDITIONS AND TREATMENT LEVEL
ON FUEL EFFICIENCY AND EMISSIONS
O496 L Single-Cylinder Engine
Ignition Timing for Highest Torque

Additive ppm(m)	Speed Hz	BMEP bar	A/F	Fuel* g/kW.h	HC g/kW.h	NO_X g/kW.h	CO g/kW.h
0	40	2.51	14.5	374.0	6.63	16.64	39.44
500	40	2.51	14.5	380.8	5.83	15.18	40.25
1000	40	2.51	14.5	381.9	6.27	15.57	40.33
0	40	2.51	14.5	376.5	6.59	16.75	39.70
0	40	5.5	14.5	294.6	4.45	18.01	27.25
500	40	5.5	14.5	295.0	4.33	18.90	27.31
1000	40	5.5	14.5	294.7	4.45	18.58	27.26
0	40	5.5	14.5	295.1	4.39	18.61	27.30
0	20	5.5	14.5	298.1	5.54	13.06	43.19
500	20	5.5	14.5	297.2	5.49	12.65	46.66
1000	20	5.5	14.5	300.9	5.26	13.19	43.63
0	20	5.5	14.5	298.7	5.65	13.75	39.58
0	20	1.5	14.5	489.9	11.47	3.44	32.53
500	20	1.5	14.5	491.2	10.32	3.95	32.69
1000	20	1.5	14.5	490.6	12.02	3.44	32.54
0	20	1.5	14.5	489.4	10.93	3.44	32.53
0	15	0	14.5	262.9	13.00	0.22	751.06
500	15	0	14.5	263.4	11.83	0.22	750.80
1000	15	0	14.5	263.3	13.50	0.21	745.42
0	15	0	14.5	262.8	13.00	0.22	750.64

*Fuel in g/h at 0.0 BMEP

APPENDIX D
Table D-3
EFFECT OF TIMING ON FUEL CONSUMPTION AND EMISSIONS
0.496 L Single-Cylinder Engine
500 ppm(m), 40 Hz, 2.5 bar BMEP
Stoichiometric A/F (14.5)

Ignition Timing °BTDC	Fuel Consumption g/kW.h	HC g/kW.h	NOx g/kW.h	CO g/kW.h
0 ppm(m)				
25	393.2	4.533	9.444	36.263
30	385.2	5.753	12.374	40.199
35	378.3	6.548	14.966	39.383
40	378.9	6.886	17.974	39.415
45	382.6	6.824	20.155	45.078
500 ppm				
25	383.7	4.320	8.780	35.170
30	379.0	4.950	11.740	34.900
35	378.5	5.820	15.010	39.490
40	383.7	6.470	18.210	49.950
45	393.1	6.070	21.930	51.590
	——————DECREASE WITH TREATMENT——————			
25	9.5	0.213	0.664	1.093
30	6.2	0.803	0.634	5.299
35	-0.2	0.728	-0.044	-0.107
40	-4.8	0.416	-0.236	-10.535
45	-10.5	0.754	-1.775	-6.512

APPENDIX E
Table E-1

SI Fuel Economy Test Identifications for Figure 3

1. 1967, 6-cylinder, 3.3 liter engine; absorption dynamometer; 1,000 ppm Additive concentration; sustained operation at 2,200 rpm and 60% full-load; measured gradual decrease in fuel consumption to an assymptotic level over an approximate two hour period, subsequent to addition of the additive to gasoline.

2. 1986, 4-cylinder, 2.5 liter engine; computerized chassis dynamometer using the 1975 FTP; 333 ppm Additive concentration with indolene fuel; economy obtained with the carbon balance procedure following 500 miles, average of two cars (by Laboratory L-1).

3. Same as (2) but with 1986, V-8, 4.1 liter engine.

4. 0.496 liter single-cylinder research engine, absorption dynamometer (by Laboratory L-4).

5. 1.6 liter, 4-cylinder engine, economy improvement based on average of 4 runs at different spark advance settings. (Refer to Table 6 and Table D-1, Appendix D; by Laboratory L-4).

6. 1969, V-8, 5.7 liter truck with on-board flow meter; 49 miles (back and forth) interstate highway loop/20 miles 'clean-out run' with Additive/53 miles (back and forth) interstate highway loop). Economy improvements based on average of 2 runs.

7. 1979, V-8, 5.7 liter truck with on-board flow meter; 23 mile (back and forth) interstate highway loop. Economy improvements based on average of 2 runs.

8. Fleet of 5 sedans and 2 vans, each with 4-cylinder engines. Comparison of operation over 13,843 miles with untreated fuel and 13,356 miles with Additive-treated fuel; from fuel records.

APPENDIX F
Table F-1
EXHAUST VALVE SEAT WEAR
1.2 L., 4-Cylinder
Micrometers

Unleaded Run 1

	Untreated			
Hours	V1	V2	V3	V4
5	101.6	101.6	177.8	180.3
10	406.4	482.6	457.2	381.0
15	533.4	673.1	584.2	558.8
20	673.1	901.7	787.4	749.3

	Treated, 848 ppm			
Hours	V1	V2	V3	V4
5	0	0	127	63.5
10	266.7	152.4	368.3	215.9
15	393.7	241.3	685.8	457.2
20	444.5	317.5	825.5	571.5
25	495.3	368.3	990.6	673.1
30	546.1	406.4	1104.9	774.7
35	584.2	482.6	1257.3	901.7

Unleaded Run 2

	Untreated			
Hours	V1	V2	V3	V4
5	152.4	177.8	165.1	127.0
10	444.5	292.1	355.6	317.5
15	571.5	546.1	558.8	495.3
20	774.7	711.2	812.8	596.9

	Unleaded, Treated 424 ppm			
Hours	V1	V2	V3	V4
5	127.0	50.8	114.3	76.2
10	279.4	127.0	254.0	177.8
15	393.7	254.0	508.0	254.0
20	482.6	254.0	711.2	304.8

	Leaded (150 mg/L)			
Hours	V1	V2	V3	V4
5	25.4	0.0	0.0	12.7
10	12.7	-12.7	-12.7	-12.7
15	25.4	-25.4	-25.4	-25.4
20	25.4	-25.4	-25.4	0.0

APPENDIX F
Table F-2

ENGINE MANUFACTURER VALVE RECESSION TESTS

140 I-4 Engine

Untreated			Treated 556 & 1000 ppm		
	Rate, μm/h			Rate, μm/h	
Hours	Highest	Average	Hours	Highest	Average
180	10.6	4.6	149.5	6.1	3.6
259.7	10.8	4.2	228.5	7.8	2.9
379.9	5.1	3.1	50	5.6	3.0
103.4	14.2	5.6	349	10.0	3.1
			199	11.5	3.5
			83.5	3.4	2.4
			113.2	5.4	2.9
120 I-4 Engine					
182.6	8.8	7.5	278.6	5.7	4.8
146.8	12.8	6.6			
126	14.9	6.7			
260-V8 Engine					
150	13.5	5.9	500	4.1	2.3
342.2	9.7	3.1	352.2	6.5	2.8
232	5.5	2.2	129.4	7.1	3.1
			212.7	18.5	6.5
			150.9	11.6	5.6
			352.2	6.5	2.4
			304.6	12.5	6.2
275X V-8 Engine					
50	40.6	8.1	300	5.9	1.4
205 V-6 Engine					
127	4.8	3.2	285.2	3.0	1.8
			293.5	3.0	1.3
			496.6	2.4	0.8

SCHEDULE I

CERTAIN INTELLECTUAL PROPERTY

Listing of Trademarks, Patents, and Patent Pending Applications

U.S. PATENTS

PATENT NO./ ISSUE DATE	INVENTOR	TITLE	EXPIRES
4,516,981 5/14/85	Nelson, Jr., et al.	Residual Oil Sludge Dispersant	1/09/04
4,613,340 9/23/86	Nelson, Jr., et al.	Residual Oil Sludge Dispersant	1/09/04
4,673,411 6/16/87	Nelson, et al.	Anti-Gel Fuel Additive	6/16/04
4,753,661 6/28/88	Nelson, et al.	Fuel Conditioner	6/28/05
4,846,847 7/11/89	Nelson, et al.	Anti-Gel Fuel Composition	7/11/06

U.S. PATENT APPLICATIONS

SERIAL NO./ FILING DATE	INVENTOR	TITLE	EXPIRES
08/472,179 6/07/95	Nelson, et al.	Motor Fuel Additive Composition And Method For Preparation Thereof Appeal filed 5/20/99. Awaiting Response.	3/05/10 3/06/22

FOREIGN PATENT APPLICATIONS AND PATENTS

MOTOR FUEL ADDITIVE COMPOSITION AND METHOD FOR PREPARATION THEREOF

COUNTRY	SERIAL NO./ FILING DATE	PATENT NO./ ISSUE DATE	EXPIRES
AUSTRALIA		660,608 10/23/95	3/05/01
BRAZIL	PI 9106137 3/5/91	Amended 9/28/99.	3/05/06
CANADA	2,077,666 3/5/91	Exam requested 1/98 Awaiting first Office Action.	3/05/11
EPC	Countries Include: Britain, Austria, Belgium, Switzerland, Germany, Germany, Denmark, Spain, France, Italy, Luxembourg, Netherlands, Sweden and Greece	0 518 966 12/27/95	3/05/11
JAPAN	3-506077 3/5/92	2966927 8/13/99	3/05/11
SOUTH KOREA		151409 6/19/98	3/05/11

FOREIGN PATENTS

RESIDUAL OIL SLUDGE DISPERSANT

COUNTRY	PATENT NO.	ISSUE DATE	EXPIRES
CANADA	1,262,855	11/14/89	11/14/06
BRITAIN	2,174,984	10/25/89	5/07/06
ISRAEL	78742	10/14/90	5/09/06
FRANCE	2,581,563	5/09/90	5/09/06
VENEZUELA	49761	5/09/86	5/09/01
ITALY	1,190,290	2/16/88	5/08/06

FOREIGN PATENTS

FUEL CONDITIONER

COUNTRY	PATENT. NO.	ISSUE DATE	EXPIRES
BRAZIL	PI 8603711-0	6/28/94	8/05/01
CANADA	1,331,093	8/2/94	8/02/11
FRANCE	2,602,240	7/5/91	8/01/06
ISRAEL	79662	2/6/91	8/08/06
ITALY	1,196,571	11/16/88	8/07/06
MEXICO	168875	6/14/93	8/12/06
SOUTH AFRICA	86/5501	7/23/86	7/23/06
SOUTH KOREA	34765	7/30/90	8/06/06
TAIWAN	42057	10/11/90	8/01/04
VENEZUELA	49691	8/15/86	8/15/01

U.S. TRADEMARKS

TRADEMARK	REG. NO.	REG. DATE
DURALT	1,966,891	4/09/96
DURASTA	1,966,886	4/09/96
DURAFLO	1,972,823	5/07/96

FOREIGN TRADEMARKS

"DURALT"

COUNTRY		SERIAL NO.	FILING DATE
INDONESIA		HC.01-01-1090	9/09/91
MEXICO		250,071	12/11/95

COUNTRY		REG. NO.	REG. DATE
CANADA		330,690	7/31/87
FRANCE		1,355,576	5/21/86
BRITAIN	(CL. 1)	1,266,770	5/08/86
BRITAIN	(CL. 4)	1,300,476	2/10/87
ITALY		475,056	3/30/87
ITALY		600,326	7/12/93
JAPAN		2,032,111	3/30/88
GERMANY		1,131,163	11/28/88
PERU		043153	1/30/98
VENEZUELA		135012	9/23/92

Federal Trade Commission

Complaint Against Lubrizol Corporation

By: Mark L. Nelson
Co-Founder of
Polar Molecular Corporation

Volume I

OVERVIEW OF ATTACK BY LUBRIZOL AND ITS ALLIES ON POLAR MOLECULAR CORPORATION

LEAD PHASE-DOWN

The EPA's mandated phase-out of the use of tetraethyl lead (TEL) as an octane boosting additive in gasoline motor fuels began in the early 1970's, when catalytic converters were installed in new U.S. autos to improve exhaust emission standards. Ethyl, the developer of TEL, attempted to slow the phase-out of TEL content in gasoline to preserve their market. According to Ethyl and other industry authorities, TEL provided two benefits for gasoline engines. (1) TEL boosted the octane rating of gasoline motor fuels, thus allowing for the development and use of higher horsepower engines. Without the anti-knock benefits of TEL, engine parts such as pistons would suffer damage due to engine knock, detonation, and pre-ignition. (2) A second benefit of TEL claimed by Ethyl was that lead deposits that formed on the exhaust valve seat provided a lubricating benefit that prevented excessive exhaust valve seat wear (recession), when gasoline engines were operated at high speeds and heavy-load duty cycles.

HARMFUL EFFECTS OF TETRAETHYL LEAD (TEL)

The EPA mandated that TEL must be phased out over time in all gasoline motor fuels because of the effect of the toxic emissions of lead oxides into the air we breath. Furthermore, new cars with catalytic converters were not allowed to use fuels with TEL present in the fuel, because TEL is known to "poison" the catalysts in the catalytic converter exhaust system. Therefore, only unleaded gasoline could be used in new cars equipped with catalytic converters. In older cars not equipped with catalytic converters, lead phase-down, gradually reducing lead additive content in gasoline over time, began.

VALVE SEAT RECESSION

By the mid-1980's, lead additive content had been phased down in leaded fuel from approximately .5 g/gallon to .1 g/gallon. Ethyl Corporation reacted by creating concerns among user groups for engines designed for leaded fuel. These user groups included owners of older cars, marine engines, farm, fleet and construction equipment users, and motorcycle owners. These user groups were told that without the lubricating properties of lead oxides on exhaust valve seats, severe wear could occur at high speeds and heavy load operating conditions. Furthermore, such engines could suffer engine part failure due to knocking, pinging and detonation, if 87 unleaded regular was used instead of 89 octane leaded regular. The oil refiners reacted to the problem of detonation by offering 89 octane unleaded "mid-grades".

In the meantime, Lubrizol and Dupont offered "lead substitute" additives which they claimed formed deposits on the valve seat of the engine to replace the lost lubricating properties of TEL. Unfortunately, the deposit-forming tendencies of the additives offered by Lubrizol and Dupont caused other harmful effects in the engine. One harmful effect of these deposit forming additives was to increase the engine's demand for octane. This is due to a well-known phenomena in the industry, known as octane requirement increase, (ORI). PMC's fuel additive product, DurAlt FC, also reduced valve seat recession without creating harmful deposits in the engine.

WHAT IS OCTANE REQUIREMENT INCREASE (ORI)?

ORI is a phenomena which occurs in every gasoline engine. When the engine is started up for the first time, carbon deposits begin to form in the combustion chamber due to incomplete combustion . As these deposits build up over the first 10,000-20,000

miles of the engine's life, the engine's demand for octane increases by as much as ten numbers. This octane requirement increase (ORI) is caused by the effects of the build-up of deposits in the combustion chamber. Other deposits, caused by detergents and other additives in the fuel, increase the negative effects of this problem. Regular leaded gasoline is 89 octane. Regular unleaded gasolfine is 87 octane. Thus, the need for an additive that reduced ORI, enabling the use of 87 octane gasoline without the damaging effects of knocking, pinging and detonation became important. PMC's fuel additive technology, DurAlt FC, filled that need.

THE DEPOSIT FORMING TENDENCIES OF THE LUBRIZOL AND DUPONT PRODUCTS ACCELERATE THE PROBLEM OF OCTANE REQUIREMENT INCREASE

Both the Lubrizol and Dupont products deliberately created deposits in the combustion chamber, not only on the exhaust valve seat, but literally on all other combustion chamber parts, including pistons and exhaust valves. These deposits not only cause the engine's octane appetite to increase, but can also damage engine parts. Therefore, there are serious negative side effects, including increased ORI, associated with the use of deposit forming additives. [See U.S. Oil Week article of April 27, 1987, "Lead Substitutes Harmful, Not Effective - Study Shows"] Eventually gasoline refiners, such as Shell and Texaco, publicly admitted that the detergent additives refiners had been using ended up in the combustion chamber as deposits and exacerbated the problem of octane requirement increase.

In fact, on June 1, 1989, a Wall Street Journal appeared entitled, "Gasoline Firms Push Cure to Problem They Caused", representatives of Texaco and Shell advised that they had developed new detergents which were octane requirement increase (ORI) neutral. That is, the new detergents would not increase combustion chamber deposits. The first detergents used by the oil companies cleaned carburetors and injectors. The "second generation" of detergents that were developed cleaned the second stage of the engine, the intake system and intake valves. The "third generation" of detergents discussed by Texaco and Shell were designed to clean the first two stages of the engine without forming harmful deposits in the combustion chamber. However, as explained by the Shell research official quoted in the story, the "ultimate goal is an additive that could keep the engine's insides [combustion chamber] clean from the outset. That is sort of the Holy Grail", said the Shell researcher.

PMC INTRODUCED TO LUBRIZOL: 1985

In 1985, PMC, through its investment banker, Hambrecht & Quist, began to seek out major corporations who could assist the Company in exploiting its fuel additive technology. Based on fleet and limited laboratory tests, PMC's fuel additive technology, DurAlt® Fuel Conditioner (FC), was proven to reduce combustion chamber deposits and the engine's demand for octane. Fleet customers and two engine manufacturers, Harley-Davidson Motor Company and Mercury Marine, noted that engine tear-down inspections, verified that combustion chamber deposits were dramatically reduced by the use of DurAlt FC. Thus, DurAlt FC fulfilled the final stage of detergent additive requirements, combustion chamber cleanliness. [This constitutes the "Holy Grail" of fuel additive development as described by the Shell researcher quoted in the Wall Street Journal.]

Contacts were made on behalf of PMC by Hambrecht & Quist with Ethyl, Dupont, Englehardt Chemicals and the Chemical Division of Pfizer, Inc. of New York. Meanwhile, contacts were made by the two New York-based consultants for the Company, Henry Geier, Vice President and Comptroller of First Boston Corporation, and New Jersey attorney, Bruce Meisel. Their contacts included Lubrizol and Arthur D. Little, Inc. As a result of the introduction by Geier, Arthur D. Little, Inc., with the consulting assistance

of a former Gulf Oil researcher, assessed the market opportunity for DurAlt FC technology. Due to their positive findings, Arthur D. Little, Inc. provided a "draft" licensing proposal to PMC, offering to license the DurAlt FC technology worldwide.

According to Geier and Meisel, Lubrizol was also extremely interested in the DurAlt FC technology and conducted some preliminary meetings with Geier and Meisel, including a visit on a Sunday afternoon at Geier's vacation home on Long Island. According to Geier, the meeting was attended by the Vice President of Marketing, Fuel Additive Division, for Lubrizol and another Lubrizol representative. Shortly after that time, Mercury Marine, who had been testing the Lubrizol product and DurAlt FC, selected PMC's product to market to the marine industry rather than the product of Lubrizol, which was known as Powershield. Curiously, after Mercury Marine's decision was made known, Lubrizol lost interest in DurAlt FC, according to Geier.

The selection of DurAlt FC by Mercury Marine rather than Lubrizol's Powershield was a severe blow to Lubrizol's marketing and business strategy. Mercury Marine was the #1 marine engine manufacturer, worldwide. The marine industry was a key target for the "lead substitute" market created by EPA's lead phase-down and the concerns raised by Ethyl, Dupont and Lubrizol related to the potential for excessive engine wear (valve seat recession), due to the absence of lead additives in gasoline.

IN JANUARY 1986 LUBRIZOL ANNOUNCED ITS NEW NON-METALLIC GASOLINE ADDITIVE, POWERSHIELD, AS A SUBSTITUTE FOR THE LUBRICATING PROPERTIES OF LEAD ADDITIVES - LUBRIZOL TOUTES POWERSHIELD AS MAJOR MARKET POTENTIAL-SOME ELEMENTS OF INVESTMENT COMMUNITY NOT CONVINCED.

An analysis of the announcement and other matters concerning Lubrizol was written by James A. Cunningham of First Boston Corporation, in which Cunningham made a "sell" recommendation for Lubrizol's stock. The article was entitled, "Lubrizol (LZ) Powershield Gasoline Additive Formally Announced; Still Disappointing Near Term Earnings Outlook". The First Boston analyst refuted Lubrizol's claim that Powershield would be a major source of new revenue for the Company, citing several hurdles which Lubrizol would have to overcome. "(i) The fact that the primary end market of leaded gasoline and pre-1975 automobiles will obsolete itself. (ii) Some now unforseen pollution problems could develop. (iii) Even at only a penny per gallon more, it is unclear whether the consumer or the oil companies will conclude that the potential valve [wear] problem on older cars and other vehicles is worth it. (iv) It is not clear whether the auto industry will push for this product. (v) It is unlikely that the EPA will mandate this product so that Lubrizol will need to find some company to do the pioneering work and hope that others will follow suit. Lubrizol is working on a derivative of the new technology which would be appliable to unleaded gasoline and probably offer a larger non obsoleting potential. No time table is known for the commercialization of this product."

The "sell" recommendation was repeated by First Boston Corporation on May 16, 1986.

> [See Crowell, Weedon & Co. financial report dated January 2, 1986 which reported that Lubrizol's non-metallic gasoline additive, Powershield, had the potential of doubling company per share earnings if adopted by refiners to replace the beneficial lubricating effects of TEL lead in gasoline. Crowell, Weedon & Co. stated further, "We understand that the EPA may endorse Lubrizol's product and may suggest that U.S. producers of leaded gasolines employ it....Lubrizol is permitted to use its

additive [Powershield] in leaded gasolines and is working to gain approval [through EPA waiver] for its use in unleaded gasolines".]

Lubrizol, at the time, was the recognized world leader for engine oil additive packages made available to oil companies for their engine oils. Lubrizol, however, had failed to make significant in-roads in the fuel additive market for oil refiners, and was attempting to use Powershield as a means of establishing itself as a leader in the fuel additive market for refiners.

Lubrizol had a three point strategy to capture and monopolize the market share for fuel additives with refiners:

Step #1. Retail package/Consumer/Private label
Lubrizol sought to gain the endorsement and dominant private label, retail package market position with U.S. engine manufacturers, including Mercury Marine, Crusader Marine, Harley Davidson, the U.S. car companies and tractor manufacturers.

Step #2. Independent Fuel and Oil Distributors
Lubrizol would then attempt to capture and monopolize the market for lead substitutes for the independent fuel and oil distributors who served as the transmission belt for the oil refiners in supplying fuel to fleet operators, farm co-ops, marine harbors, etc. Lubrizol planned to have its additive, Powershield added as a bulk treatment additive for fuels delivered to these operations.

Step #3. Oil Refiners
Upon capturing the markets described in Step 1 and 2, Lubrizol planned to seek a waiver from the U.S. EPA for the addition of its product, Powershield, as an additive for bulk treatment by refiners. Powershield was not deemed "substantially similar" to gasoline. Therefore, Lubrizol had to provide substantial data to the U.S. EPA proving that its sulfur-based additive would not harm catalytic converters. Ultimately Lubrizol hoped to substantially increase its market share for additives, including detergents, with oil companies by gaining market dominance with Powershield.

To gain refinery acceptance for Powershield, it was critical that Lubrizol receive a waiver from EPA for bulk-treatment of unleaded gasoline. Lubrizol believed this would be possible due to the developing concerns related to valve seat wear (recession) in the farm, fleet, marine and motorcycle markets due to lead additive phase down. The EPA was under tremendous pressure to delay or even abort lead additive phase-down due to these concerns. A fuel additive solution to respond to concerns related to valve seat wear could help to relieve the pressures being applied to the EPA from the effected user groups. Lubrizol's product was non-metallic but contained sulfur which could have a negative effect on catalytic converters. However, Lubrizol believed that the use of Powershield at low concentration levels would demonstrate, through their tests, no harm to catalytic converters. Dupont's "lead substitute" was a metallic, phosphorous-based fuel additive which demonstrated negative effects on catalytic converters. Therefore, Lubrizol had the best chance for success in receiving a waiver from the EPA for bulk treatment of unleaded fuel with Powershield, and for marketing the product to U.S. oil refiners.

IN 1986, PMC AND DURALT FC TECHNOLOGY CAUSED MAJOR SETBACKS TO LUBRIZOL'S PLANS

1. Mercury Marine contract

During 1985, PMC's fuel additive technology, DurAlt FC, was successfully tested by Mercury Marine, Crusader Marine and Harley-Davidson Motor Company. PMC, in February of 1986, signed an exclusive marketing agreement with Mercury Marine for distribution of DurAlt FC in consumer retail packages to the worldwide marine industry. DurAlt FC was selected over Powershield despite the fact that Mercury Marine's tests demonstrated Powershield was somewhat more effective in reducing valve seat recession during accelerated wear tests performed by Mercury Marine. DurAlt FC, however, performed satisfactorily in the valve seat recession tests, according to Mercury Marine. More importantly, however, DurAlt FC demonstrated the ability to greatly reduce combustion chamber deposits, whereas Powershield increased combustion chamber deposits dramatically. In outboard engines in particular, combustion chamber deposits can cause serious engine damage. It was for this reason that DurAlt FC was selected by Mercury Marine.

Attorney Bruce Meisel and his business associate, Henry Geier of First Boston Corporation, had initially introduced DurAlt FC technology to Lubrizol. Meisel and Geier were consultants to PMC and knew of the Mercury Marine contract negotiations. They were advised by PMC management that PMC would seek a provision wherein Mercury Marine agreed not to market any other lead substitute in return for receiving the exclusive right to market DurAlt FC in retail packages to the marine industry. Meisel, who was an attorney, asked to represent PMC at the final contract negotiations meeting. At the meeting, Mercury Marine agreed not to market a competitive "lead substitute". Incredibly, Meisel then said to Mark Nelson, in the presence of the Mercury Marine representatives, "You don't need that provision in the contract; after all, don't you have confidence in your product?" This incredible and inexplicable statement by Meisel caused PMC to lose a vitally needed protective clause in the contract and opened up the opportunity for mischief on the part of Lubrizol and their supporters at Mercury Marine. This paved the way for a disaster that later befell PMC.

2. Crusader Marine

Crusader Marine, a major competitor of Mercury Marine, recommended <u>both</u> Powershield and DurAlt FC as lead substitutes to their customers. In a later service bulletin, Crusader Marine advised their customers that valve seat recession problems had never materialized. However, Crusader Marine revealed that engine failures due to knocking, pinging and detonation had become a serious problem due to the use of lower octane fuel. The ability of DurAlt FC to reduce engine octane requirement, through reduced combustion chamber deposits, (while Powershield increased combustion chamber deposits), gave PMC a strategic advantage over Lubrizol.

3. Harley-Davidson

Harley-Davidson selected DurAlt FC as their "lead substitute" because of their tests that demonstrated (a.) Harley-Davidson engines were not prone to valve seat recession, and (b.) that DurAlt FC greatly reduced combustion chamber deposits and allowed the use of lower octane unleaded fuel in Harley-Davidson motorcycle engines [Powershield increases combustion chamber deposits, resulting in negative side effects.]

4. EPA Deems DurAlt FC "Substantially Similar"

On May 8, 1986, PMC received official notice from the EPA that DurAlt FC was "substantially similar" and could be legally added as a bulk treatment additive by refiners and others to gasoline motor fuels labeled "unleaded".

[After the Harley-Davidson and Mercury Marine announcements, a New York-based investment banker, Reich & Company, offered on April 28, 1986 to do a public financing for PMC. Upon learning this, consultants Meisel and Geier volunteered to work with Reich & Company as consultants to PMC for the purposes of the assisting PMC in the public financing. When the EPA letter arrived the morning of May 8, Geier and Meisel were advised of this incredibly important good news. On the morning of May 8, PMC's stock was trading at approximately $6 per share. That afternoon, however, before the EPA approval was publicly announced, the stock mysteriously plummeted to approximately $3 per share. PMC management had been hearing rumors that a large "short sell" position had been building in the Company's stock. Ted London, chief trader at Reich & Company, later admitted he had been "shorting" PMC's stock to "maintain an orderly market". This was the beginning of widespread manipulation of PMC's stock and stock price which disrupted the Company in its relationship with its shareholders and the financial community, and undermined the Company's ability to finance its growth.]

LUBRIZOL AND CO-CONSPIRATORS ATTEMPT TO DESTROY PMC IN ACCELERATED MULTI-FACETED ATTACK

During the period of time that followed, PMC worked diligently with Harley-Davidson and Mercury Marine to develop label art, brochures, posters and other marketing materials to launch the new Mercury Marine and Harley-Davidson/DurAlt FC products. Lubrizol attempted to disparage DurAlt FC with Harley-Davidson and replace DurAlt FC with Powershield [See letter from Lubrizol to Harley-Davidson, September 1986.] Also during this period of time, Lubrizol worked with its inside contacts, James Steffes and Robert Mains at Mercury Marine to disparage DurAlt FC, and disrupt the relationship and contract between PMC and Mercury Marine. It was later learned that Lubrizol was able to sign a contract with Mercury Marine for the use of Powershield by Mercury in a private label arrangement.

At least one journalist, Richard Thiel, was advised by Lubrizol and Mercury Marine that Powershield was to be marketed by Mercury Marine. Thiel was also told that the Mercury Marine/PMC announcement was untrue. Thiel commented on this "mis-information" in a story he wrote for Boating Magazine for the October 1986 issue. The article, entitled, "Unlead Update", is attached. On October 16, 1986, PMC employee Keith Moon, called Art Mains of Mercury Marine, one of Lubrizol's "inside men" at Mercury. In response to a question by Moon, Mains stated that the announcement of a contract earlier that year between PMC and Mercury Marine was untrue. (See transcript of telephone call.) On October 20, 1986, PMC received a letter from Mercury Marine advising PMC that the $4.5 million exclusive supply contract between the two companies was being terminated.

When Reich & Company, Bruce Meisel and Henry Geier were advised of the termination of the Mercury Marine contract, Reich terminated the $2 million financing that was being prepared for PMC. The termination of the financing put PMC on the verge of bankruptcy. Later, however, in December, 1986, PMC signed a licensing and equity contract with the Chemical Division of Pfizer, Inc. of New York, as a result of the Company's negotiations with Pfizer which were initiated by Hambrecht & Quist in early 1986. The signing of the Pfizer contract effectively saved PMC from bankruptcy. After the signing and announcement of the PMC/Pfizer contract, Hambrecht & Quist raised for PMC vitally needed equity capital through private placements with their investment

customers. After PMC secured the investment monies by Hambrecht & Quist, Reich later, in May of 1987, agreed to go forward with the public financing now re-scheduled to be completed in the Fall of 1987.

On June 5, 1987, after extensive negotiations to resolve differences, a lawsuit ensued between Mercury Marine and PMC. Mercury Marine initiated this suit in an attempt to position itself as the Plaintiff in the dispute, saying that PMC had misrepresented the performance capabilities of DurAlt FC. This allegation was merely a "ruse", as the contract written and signed by Mercury Marine clearly stated that Mercury Marine was entering into the agreement with PMC due to Mercury Marine's own test results on DurAlt FC. In fact, Mercury Marine's official policy concerning claims for products it marketed under private labels was that only Mercury Marine test results could be used to support performance claims.

Product disparagement by Lubrizol and their collaborators at Mercury Marine undermined PMC's marketing efforts, delaying PMC's market entry and created a Lubrizol monopoly in the lead substitute market in the two years that followed.

Lubrizol disparaged PMC and its products to oil refiners, automotive companies, engine manufacturers, industry journalists, Wall Street and the financial community and shareholders of PMC.

Among the marketers of Lubrizol's product were various re-packaging distributors who assisted Lubrizol in its attacks on PMC and disparagement of PMC's products. These companies included ValvTect, Index, and ET Lubricants. These three companies and other marketers of Lubrizol's Powershield disparaged DurAlt FC technology with automotive merchandisers, fleet operators, marine harbors, classic car owners, independent fuel distributors, journalists and other industry sources. Attached are examples of some of the documents and other evidence related to these activities. These activities continued up to the time of the takeover of PMC in 1992.

Lubrizol was assisted in this Company and product disparagement by Mercury Marine engineers, Gilliam Clark, a fuels specialist with Chrysler Corporation, and Mike Marianacci of Stockbridge Corporation owned by the notorious short sellers of publicly traded securities, the Feshbach Brothers. The Feshbachs and Lubrizol collaborated to drive down the price of PMC's stock through false rumors, lies and general disparagement. Lubrizol benefitted from this scheme since lower stock prices made it more difficult for PMC to sell its stock to the public to finance its operations and market growth, thus strengthening their growing monopoly in the lead substitute market. The Feshbachs benefitted from their profits made by selling PMC's stock short at higher prices and then delivering shares purchased at lower prices to cover their short position.

Lubrizol also conspired with consultants, employees, directors and New York-based investors of PMC, who were attempting to take over the Company, bankrupt the Company, and seize the Company's patents for their own benefit to the detriment of the founders and shareholder of the Company. This group disrupted the Company's operations, business relationships, contracts and market efforts, disparaged the products, founders and management, drove the stock price down through orchestrated waves of selling and short selling of the Company's stock, and in November, withheld a $6 million financing in an attempt to gain control of the Board of Directors. This was done in a deliberate attempt to weaken the Company and make it vulnerable to their takeover objectives. Thus these individuals, with a fiduciary responsibility to PMC,

conspired with Lubrizol to destroy the Company, seize the Company's patents and sell them to Lubrizol or some other industry player.

IN OCTOBER 1988 THE BOSTON INVESTOR GROUP PURCHASED $2.25 MILLION OF PMC STOCK - SIGNED "STAND-STILL" AGREEMENT

A group of investors, including Wayne Huizenga, Sr. and A. Clinton Allen II made a large investment in PMC. The investment agreement included a "stand-still" provision in which the group agreed they would not attempt, directly or indirectly, to gain more than 25% controlling interest of PMC before October 1993. A. Clinton Allen was Vice President of a investment banker for PMC, Advest, Inc. As part of the deal, Allen immediately joined PMC's Board of Directors.

ON DECEMBER 6, 1989, A. CLINTON ALLEN RECOMMENDED REORGANIZATION OF THE BOARD OF DIRECTORS

Allen, and others of the Boston investor group had signed a "stand still" agreement when they invested in PMC in October of 1988. His recommendations for reorganization of the Board would have effectively given control of the Company to the New York and Boston investor groups.

RONALD KRUMM, NEW PMC EXECUTIVE ALIGNED WITH THE NEW YORK FACTION SETS THE STAGE FOR TAKEOVER - NEW YORK OFFICE OPENS

At the suggestion of Hal Cerra, a PMC Board member, a New York office for PMC was opened. Cerra volunteered and effectively became an interim Chief Operating Officer/Chief Financial Officer. Ron Krumm worked with Cerra at the New York office as Vice President of Marketing and Sales. On one of Krumm's first trips to PMC's headquarters in Saginaw, Michigan, Krumm took David Parker and his wife to dinner. Krumm came to PMC from Pfizer and had known Parker since early 1988. At dinner, according to an affidavit submitted by Parker, Krumm advised Parker that Mark Nelson should not be running the Company and that PMC should be run from New York. Parker also stated in his affidavit that all of Krumm's activities that followed the dinner meeting clearly demonstrated that Krumm intended to take the Company over. It is believed that Parker was approached by Krumm because Parker was sometimes critical of Mark Nelson. Parker did not reveal the facts detailed in his affidavit to PMC management until much later when the New York faction takeover had failed. In fact, Parker is now working for the Boston faction who ultimately took the Company over in June 1992.

ON JANUARY 25, 1989 PMC SIGNED A FINANCING DEAL WITH REICH & COMPANY/FESHBACH-LUBRIZOL SHORT SELLING ATTACK BEGINS-MARKET MANIA PUBLISHED NEGATIVE STORY

PMC paid Reich & Company an initial down payment of $25,000 to do a $5 million warrant exchange from warrants issued in the 1987 PMC/Reich public financing. The financing was to be completed by late summer, 1989. On the same day, a negative article appeared in Market Mania, written by an analyst who was a friend of Ted London, Chief Trader for Reich. The short position reported in PMC's securities jumped significantly for February 1989 and continued to rise substantially in the months that followed. The short selling attack on PMC caused the price of the Company's publicly traded stock to decline substantially over that period from a high of $5.75 per share in 1989 to an all-time low of 25¢ per share in late 1990.

NOVEMBER 1988 - AL SMITH, TOP FORD MOTOR ENGINE DEVELOPER, REVIEWS PMC/PFIZER DRAFT MANUSCRIPT FOR SAE PAPER PUBLICATION - DURALT FC

Lubrizol attempts to stop paper - SAE approves:
When PMC first provided its draft manuscript for the proposed publication of a scientific paper on DurAlt FC, Lubrizol was on the Committee that reviewed the manuscript. Lubrizol attempted to block publication of the scientific paper on DurAlt FC by the SAE. (See Lubrizol's comments stating that the SAE had rejected the paper in the joint Lubrizol/Feshbach propaganda attacking PMC.) When PMC learned of Lubrizol's involvement on the review committee, management advised the SAE of the extreme adversarial relationship between the two companies. The SAE then directed the manuscript to another committee of industry experts who had no conflict with PMC. After careful review, the manuscript was then readily accepted, following minor suggestions by the committee to PMC and Pfizer. At the time, Al Smith, Manager of Tempo/Topaz Engine Development for Ford Motor Company and Manager for Engine Development for Ford's "World Car Project", reviewed the manuscript and deemed it highly acceptable, based on SAE standards. Smith had been Committee Chairman for numerous SAE committees for the review of scientific papers published by the SAE. (See Smith's letter dated November 30, 1988.)

JANUARY 11, 1989 - GIL CLARK, CHRYSLER FUELS SPECIALIST & ALLY OF DON KOEHLER OF LUBRIZOL, DISPARAGES DURALT FC

DurAlt FC had been used for bulk treatment of gasoline motor fuels for five years. Fleets of vehicles, including GM, Ford, Chrysler, International, etc., using DurAlt FC treated gasoline reported improved fuel system and engine maintenance reliability with the use of DurAlt FC in all makes and models of equipment. In a letter dated June 30, 1987, General Motors AC Division concluded that their test of DurAlt FC demonstrated no negative or adverse effects on fuel system parts or filters. [DurAlt FC contains a highly effective corrosion inhibitor.] In the early winter of 1988, a Sheriff Department in Monroe, Michigan, near Detroit, that had been using DurAlt FC with good results for several months, reported a fluke fuel related problem. The problem occurred in Chrysler fuel tank filters only when cold weather set in. (Water build up in fuel tanks due to condensation becomes a typical and well-known problem in automotive equipment during cold weather.) The GM and Ford fuel tank filters were not affected. The Chrysler fuel tank filters suddenly plugged off, causing an interruption of the flow of the fuel from the fuel tank to the fuel line exiting the tank. When the in-tank fuel filter was replaced and the fuel tank purged and re-filled with gasoline, the problem occurred soon after.

An independent laboratory, Analysts, Inc. of Chicago, Illinois, was consulted by PMC. Analysts, Inc. evaluated the fuel and fuel filters from the Chrysler tanks. They also analyzed fuel from the bulk fuel storage tanks. It was determined by Analysts, Inc. that the fuel was in a highly oxidized state which caused gums to form, a common problem in today's catalyst-cracked gasolines. The fuel also contained significant quantities of water. It was concluded by Analysts, Inc. that the gums in the oxidized fuel swelled when they came in contact with the water and plugged off the filters in the Chrysler fuel tanks. Since the problem was only experienced in Chrysler fuel tank filters, PMC Vice President, James Larson, as a service to the customer, called Gil Clark, a fuels specialist with Chrysler in Detroit, to explain the problem occurring at Monroe County and asked how Chrysler fuel tank filters differed from GM, Ford or other manufacturers.

On January 11, PMC representatives met with Monroe County Sheriff Department and county officials to discuss the findings of Analysts, Inc. Gil Clark of Chrysler was unexpectedly present at the meeting. Clark explained that Chrysler, some years ago, had installed a unique in-tank fuel tank filter that prevented dissolved water from passing through the fuel tank with gasoline. Clark drew a diagram of the unique Chrysler fuel tank filter system on the blackboard. According to Clark, the rationale behind Chrysler's decision to install a fuel tank filter that would not allow water to pass through it was Chrysler's belief that water in the fuel would effect engine performance in a negative way. GM, Ford, and all other automakers, he explained, allowed dissolved water in the fuel to pass from the fuel tank along with the fuel to be burned off in the combustion chamber. Ironically, Clark admitted no other auto manufacturer in the world deliberately collected water in the fuel tank.

Clark then produced a laboratory test beaker containing a solution of fuel, 5% water, and 20 times the recommended dosage of DurAlt FC. (This is tantamount to taking 40 aspirin at one time.) The beaker also contained strips of metal fuel tank material coated by a lead paint in an attempt to demonstrate a chemical reaction between DurAlt FC and the lead oxides in the paint coating. Clark admitted that he always criticized people that ran unrealistic tests such as this. Nonetheless, he then irresponsibly suggested that DurAlt FC may cause lead oxides to plug off the in-tank fuel filters. The PMC representatives pointed out to Gil Clark and the Monroe County officials that such a ridiculous overdosing of any additive would render the product useless at the very least and could artificially induce various chemical reactions. In fact, according to the independent laboratory, Analysts, Inc., the filters were being plugged off by a combination of water trapped in the fuel tank, which would cause the oxidized gums from the fuel to swell, thus plugging off the Chrysler fuel tank filter. It was further pointed out that the same lead paint coating was present on the interior of the GM and Ford fuel tanks. Clark then readily agreed to work with PMC to run tests demonstrating the effect of DurAlt FC on Chrysler fuel system parts. It was clear that Clark's presence at the meeting and his conduct was an attempt to deflect attention away from the negative effect on operating reliability of Chrysler's unique in-tank fuel filter design by raising an illegitimate issue concerning DurAlt FC. However, in the interests of maintaining good industry cooperation with a major automotive manufacturer, PMC agreed to run compatibility tests with Chrysler fuel system parts and DurAlt FC.

In fact, on January 13, PMC met at Chrysler with Clark and his supervisor and together laid out a series of tests to be conducted by PMC. In the interim, PMC was able to learn from Analysts, Inc. that the Chrysler fuel systems problem was being experienced all over the United States (DurAlt FC was not present in these fuels nor associated in any way with this widespread Chrysler Motor problem. Moreover, DurAlt FC was present in numerous fleets with Chrysler vehicles and not one problem was reported.) The problem created by Chrysler, wherein water was trapped in the fuel tank which would tend to accelerate corrosion of the fuel tank, was made worse due to the fact that new refinery techniques caused gasoline to be less stable and more prone to oxidation and the formation of gums in the fuel. When sufficient oxidation occurs in fuel to form gums, these gums, when in contact with water, swelled and plugged off the unique in-take fuel filters in Chrysler cars and equipment. Interestingly enough, Gil Clark admitted to PMC representatives at the meeting in Monroe that the Amoco Whiting Refinery that was the source of the fuel which serviced the Monroe County vehicles had been experiencing a great deal of trouble regarding fuel instability and the formation of oxidized gums.

Subsequently, PMC performed extensive tests which were recommended by Clark and his supervisor, including a test in which two entire Chrysler fuel systems were purchased

by PMC and operated over a long period of time. One of the two systems utilized DurAlt FC in the fuel while the second one was operated without DurAlt FC. The test results, attached, verified that the fuel system which utilized DurAlt FC was protected from the damaging effects of water in the fuel tank and filters while the second system sustained serious fuel tank corrosion and filter contamination problems.

FEBRUARY 13, 1989 - MERCURY MARINE/PMC SETTLE LAWSUIT

Through the discovery process, PMC had been able to receive all of the tests performed by Mercury Marine on DurAlt FC. The data was then turned over to scientific consultants at Columbia University, who analyzed the data statistically. Upon completing the analysis, the data conclusively proved that DurAlt FC substantially reduced valve seat wear and improved combustion chamber cleanliness in Mercury Marine engines. When the data analysis was provided to the lawyers representing Mercury Marine, Mercury Marine immediately offered to settle the lawsuit in favor of PMC. As a result of the settlement, Mercury Marine signed a three-year marketing contract with PMC in which Mercury Marine was to recommend and market DurAlt FC to its dealers and proclaim the benefits of DurAlt FC to the entire marine industry through the development and placement of magazine advertisements and brochures that Mercury Marine would pay for. Mercury Marine agreed to use 10% of its Quicksilver Accessory Division advertising budget for this purpose.

FEBRUARY 27, 1989 - LUBRIZOL ATTACKED PMC AT SAE CONFERENCE

On February 27, 1989, Lubrizol disparaged PMC's DurAlt FC technology in front of approximately 300 engineers representing worldwide refiners, automotive companies and other industry groups. This disparagement took place immediately following the presentation by PMC of its first scientific paper published by the Society of Automotive Engineers (SAE). The paper, entitled "A Broad Spectrum, Non-Metallic Additive for Gasoline and Diesel Fuels: Performance in Gasoline Engines", contained extensive test data verifying the performance benefits of DurAlt FC. The data was developed in major independent laboratories and by a major oil company, elf of France. Pfizer, Inc. of New York was co-author of the paper with PMC.

First of all, the session coordinator allowed Lubrizol to give a slide presentation rebuttal of the PMC/Pfizer scientific paper without prior notice to PMC and Pfizer. Normally, a formal presentation of comments or rebuttal to a paper being presented at the SAE requires substantial notice, well in advance, including a copy of the comments and/or rebuttal of the paper being presented. This allows the party presenting the paper an opportunity to address issues raised by the party commending or rebutting the paper within the presentation of the paper. To make matters worse, the session coordinator did not allow PMC to respond to Lubrizol's commentary and rebuttal at the session after Lubrizol's comments were made. After their comments on PMC's paper, Lubrizol launched into an unscientific and commercial attack on DurAlt FC. Among the disparaging comments made by Lubrizol was that engineers of Mercury Marine believed the product was worthless, despite the recent settlement of the Mercury Marine/PMC contract dispute. Lubrizol maintained that a Mercury Marine engineer took this position a few days before the presentation of the paper.

Prior to the presentation of the paper, PMC president, Mark Nelson, noticed Gil Clark in the audience and hand delivered a second copy of PMC's preliminary report of test data developed following the January 13 meeting of PMC representatives with Gil Clark and his supervisor. A copy of the results had been sent to Clark by A. R. Nelson of PMC by

Federal Express on February 22. The test results demonstrated that DurAlt FC had no adverse effects on fuel system parts and that PMC was continuing various tests recommended by Gil Clark. Nelson specifically pointed this out to Clark when he gave him the additional copy of the test data report before PMC's presentation was made.

When Don Koehler of Lubrizol finished his disparaging attack on DurAlt FC, he held the microphone out to his side, extending his right arm fully out while he looked straight ahead. Clark, who was on the other side of the room, in an obviously pre-arranged maneuver, hurried over to take the microphone from Koehler. Then, despite all the evidence and data to the contrary which was developed at his request, Clark made disparaging comments about DurAlt FC and fuel tank corrosion while holding up a bag of fuel filters, and then nervously and quickly exited the room before he could be confronted by PMC regarding his outright duplicity and wrongful disparagement.

Clark's disparagement in concert with Koehler and other Lubrizol representatives in the audience had a tremendous negative effect on the credibility of PMC and DurAlt FC, representing a major setback for the Company's efforts with refiners and automobile companies. Engineers leaving the session expressed shock at the blatant commercial and unscientific comments of Lubrizol and Clark before an international scientific forum. For example, Dr. Gilbert Chapelet of elf said to Mark Nelson in shocked tones as he left the room, "These are gangsters". Dr. Chapelet and other engineers openly stated that they had never seen such outrageous conduct in a scientific forum.

Mark Nelson confronted the session coordinator and challenged him for allowing unethical and highly unscientific conduct of the sort displayed by Lubrizol and Clark. A number of written complaints were filed with the SAE about the conduct of Lubrizol and Clark. PMC President, Mark Nelson, later learned that the SAE instituted measures to prevent such a reoccurrence in the future and sent a letter to the SAE in acknowledgement of the SAE's efforts to prevent such conduct in the future. This letter was acknowledged by Mr. Max E. Rumbaugh, Jr. of the SAE.

A series of letters were sent by PMC and its legal counsel during the year following the SAE conference, objecting to Gil Clark's conduct and demanding that Chrysler rectify the damage done to PMC by Clark's disparaging comments and misconduct. Despite PMC's protests, Chrysler failed to respond to the correspondence, which included conclusive proof in the form of test data formats recommended by Clark, that DurAlt FC protected Chrysler fuel systems and parts and had no adverse effect whatsoever.

RONALD KRUMM, OTHER EMPLOYEES AND SALES CONSULTANTS FROM THE NEW YORK FACTION DISRUPT PMC MAJOR MARKET LAUNCH OF 1989 AS PRELUDE TO TAKEOVER ATTEMPT

Ronald Krumm, newly hired Vice President of Marketing and Sales for PMC, had worked previously for Pfizer, Inc. and was named as an author under Pfizer's auspices of the PMC/Pfizer SAE paper. Krumm was conspicuous in his absence at the SAE conference on February 27 when the paper was presented, as numerous oil refiners, engineers and executives were present at the international conference and for the presentation of the paper. Following the disastrous product disparagement attack at the presentation of the SAE paper on February 27, Krumm became disruptive of the Company's operations and staff and was a major factor in undermining and disrupting PMC's multi-million dollar market launch of 1989.

Ronald Krumm disrupted relationships with oil jobbers distributors and potential master distributors in the oil jobber industry that were being developed by salesmen operating out of the Company's Saginaw, Michigan offices. Additionally, Krumm attempted to interfere in three critical projects being developed by Mark Nelson through his criticism expressed to Board members, staff, and Reich & Company, the underwriter of the Company's planned $5 million financing. Krumm criticized PMC's motor racing sponsorships developed to support the Company's market efforts with Amway, Ford Motor and elf Aquitaine. (In their testimonies during the 1992 trials of Krumm vs. PMC and Van Miles vs. PMC, Krumm and Miles reiterated these criticisms.) Additionally, Krumm and his collaborators, former employees of Pfizer, Inc., Van Miles and Chester Walsh, were critical of the secondary use of motor racing sponsorships and the motor racing events used to help secure new fuel distributor customers around the U.S. (Fuel distributors are local representatives of the oil refiners. The oil refiners are prominently involved in motorsports as a means of promoting their products.) The development and expansion of the Company's fuel distributor customers, building on the base of distributors located in Michigan, was the primary targeted market assigned to Krumm, Miles and the industrial sales staff of the Company that they directed.

Furthermore, Krumm and his former Pfizer colleagues, Miles and Walsh, attempted to disparage DurAlt FC without any evidence to support their theories. They suggested that the performance capabilities of the product were inconsistent from one batch to another and recommended extensive quality assurance tests be conducted at substantial expense to the Company. The negative and disruptive impact on the marketing efforts of the Company by Krumm, Miles, Walsh and others are well detailed in the attached allegations. In summary, Krumm and his New York-based collaborators attempted to undermine confidence of the Company's sales staff in the products during its crucial market launch activities of 1989. They also attempted to undermine management's strategy to utilize motorsports in support of the Amway private label, the proposed Ford Motor private label, and the developing relationship with elf Aquitaine, a major oil Company in France who specialized in high performance fuels for motorsports. (Due to management's strategy utilizing motorsports to promote DurAlt FC, Amway became PMC's largest customer, elf Aquitaine signed two contracts with PMC pioneering PMC's entry into the refinery industry, and, but for the product disparagement of Lubrizol, the multi-million dollar Ford private label agreement would have been signed in 1989.) Finally, Krumm, et. al. attempted to undermine confidence in the Company's leading product, DurAlt FC and force the Company to run unnecessary, expensive and meaningless tests rather than focus on the crucial and unprecedented marketing efforts of PMC at that time.

FORD MOTOR SPECIAL VEHICLE OPERATIONS (SVO) DIVISION PROPOSES FORD/DURALT FC PRIVATE LABEL - MULTI-MILLION DOLLAR CONTRACT UNDERMINED BY LUBRIZOL, GIL CLARK DISPARAGEMENT OF DURALT FC

In January, 1989, after testing DurAlt FC, two engineers of Ford Motor SVO Division, Len Pounds and Rod Girolami approached PMC with a Ford Motor private label opportunity for DurAlt FC. Pounds and Girolami were very excited about the prospect of selling DurAlt FC as a Ford Motor SVO product. Ford Motor SVO Division used motorsports to test and refine new engineering developments for Ford Motor Company, and wished to sell DurAlt FC as a Ford private label product in their parts catalogue. A multi-million dollar draft agreement was developed between Ford SVO and PMC, along with a preliminary brochure and artwork for bottle label. Additionally, PMC signed a sponsorship agreement with Lyn St. James, a Ford Motor racing personality to help

promote the proposed Ford/DurAlt FC private label product. A top engineer and Powertrain development executive at Ford, Al Smith, provided from published test data, a list of claims that could be utilized with the new Ford/DurAlt FC private label product. The anticipated revenues from the multi-million dollar proposed contract was vital to PMC's profitability. Moreover, tremendous credibility would accrue for DurAlt FC with refiners, fleet operators, fuel distributors, and consumers because of the relationship and endorsement by Ford of DurAlt FC.

Furthermore, as a result of the Ford/PMC relationship, Dick Baker, former engineer of Fuels and Lubricants for Ford and then Manager of Engine Engineering, agreed to recommend to major refiners that they begin in-house testing of the product as a next step in adopting the use of DurAlt FC as an ORI control additive for bulk treatment by refiners, which would benefit the oil companies and the automobile companies.

On September 13, a technical meeting occurred between Ford and PMC. In attendance at the meeting were Mark Nelson, as well as three members of the Company's Scientific Advisory Board, Glenn Rightmire, Richard Fein and David Zudkevitch. In attendance for Ford were Dick Baker and Carol Smith of the Chemical Engineering Department. In unexpected attendance was Charles Sherwood, a fuels specialist at Ford Motor Company. The purpose of the meeting was to discuss various theories underlying the mechanism of action that caused DurAlt FC to perform. Ford Motor and PMC were confident that the product performed and provided important benefits based on independent laboratory data, but were unsure of the mechanism of action that caused DurAlt FC to perform. During the course of the meeting, Dick Baker mentioned, apologetically, that Charles Sherwood had something to show the PMC attendees. Baker said, "I know you have seen this before and that you have an explanation for it, but Charlie wanted to show you this." Sherwood then produced a laboratory test beaker with a concoction identical to the unrealistic and irresponsible display presented by Gil Clark at Monroe, Michigan. The illegitimate and unethical DurAlt FC product disparagement by Clark was well known to Ford Motor engineers. However, Sherwood's introduction of the Gil Clark beaker "test", although regarded by Ford engineers as scientifically unsound, caused concerns of a political nature for the conservative engineers with whom PMC was dealing.

As a result, in a subsequent discussion with Dick Baker, he advised Mark Nelson that he didn't wish Ford embarrassed by the product disparagement initiated by Lubrizol and Clark. He further advised Nelson that he would not oppose the Ford Motor/DurAlt FC private label. However, he stated that if PMC and Ford pursued the private label, he would withdraw his support in the efforts by Ford to introduce the product to oil refiners. Dick Baker, in order to avoid Ford Motor being embroiled in an illegitimate controversy created by Lubrizol and Clark, advised Nelson he would withdraw his support in introducing DurAlt FC to refiners if the Ford private label deal went forward. As a result, Mark Nelson was forced to send a letter to Mr. Len Pounds of Ford Motor SVO Division, discontinuing the proposed private label opportunity in order to maintain Ford Motor's support for the Company's long term objectives to gain refinery acceptance.

Furthermore, Nelson suspected that the Ford private label deal would become untennable because of Sherwood's activities at the meeting with Baker, et. al., especially since Ford had a great deal to gain by the inclusion of DurAlt FC in motor gasoline as an ORI control additive. The use of ORI control additives by refiners would assist Ford and other automotive companies to meet fuel economy and emmissions standards set by the EPA. Once again, as a result of the Lubrizol product disparagement campaign, PMC lost a multi-million dollar contract and tremendous market advantage.

IN NOVEMBER, 1989, THE NEW YORK FACTION ATTEMPT TO GAIN CONTROL OF PMC BOARD OF DIRECTORS BY WITHHOLDING A $5 MILLION FINANCING

After disrupting the Company's aggressive market efforts in 1989, the New York faction, acting in concert with Reich, an investment banker, withheld a vital $5 million financing, the preparation for which had been under way, at substantial cost to PMC, since January of that year in an attempt to gain control of the Company's Board of Directors. Reich & Company and its New York faction allies on PMC's Board of Directors, cited the Company's sales performance (for which Krumm was responsible) and anticipated temporary losses, due to the expanded market efforts, as the rationale for assuming control of the Board of Directors.

IN APRIL OF 1990, PMC PRESIDENT MARK NELSON WARNS LUBRIZOL'S CEO, LESTER COLEMAN, OF ILLEGAL ACTS AGAINST PMC BY LUBRIZOL PERSONNEL/COLEMAN RESPONDS, "WE WILL LOOK INTO THE MATTER"

On April 17, Mark Nelson sent a letter to Lester Coleman, Chief Executive Officer of Lubrizol, warning him of predatory acts conducted by Don Koehler against PMC. These acts included product disparagement, tortuous interference, and conspiracy with short sellers of PMC's publicly traded securities. Nelson warned that a continuation of these acts, the obvious result being the delay of PMC's market entry and a monopoly for Lubrizol in the lead substitute fuel additive market, would eventually result in litigation against the conspirators. Nelson urged Coleman to contact him to discuss the matter and avert litigation against Lubrizol and others.

On April 26, Lester Coleman responded in a letter to Nelson promising to have the matter reviewed internally, at which time he would respond to Nelson's concerns. Coleman failed to respond to Nelson's concerns and, in fact, the attack on PMC and its product by Lubrizol employees, including Koehler, continued. The following month, in what is believed to be a reaction to Nelson's warning letter to Coleman, a vicious, scandalous, extortionary lawsuit was brought against Nelson and PMC, orchestrated by a convicted felon working with Lubrizol, the New York and Boston factions at the time.

IN MAY OF 1990, RONALD KRUMM AND HIS CRONIES RESIGN FROM PMC, ACT AS REFERENCE FOR CONVICTED FELON, FORMER PMC EMPLOYEE WORKING WITH LUBRIZOL, INITIATES SERIES OF LAWSUITS AGAINST PMC TO DISRUPT COMPANY

After the failed attempt on the part of the New York faction and their allies to take over PMC, Ronald Krumm and a number of directors, employees and consultants of PMC from the New York faction resigned or were fired. During the course of 1990, a number of lawsuits were filed by them against Mark Nelson and the Company. Nelson was specifically targeted as he was the primary stumbling block to the efforts to take over PMC. Krumm's last day as an employee of the Company, selected by him, was May 15. On that day, Mark Nelson and the Company were served the first complaint in a series of complaints.

The first suit was orchestrated by Randall Trombley, a.k.a., Groomes, later discovered to be a convicted racketeer and extortionist. Trombley had worked for PMC until September 29, 1989 and reported to Ron Krumm in the sales department. He did not reveal his criminal conviction to the Company when he sought employment with PMC in 1987. Trombley had sent a number of letters to Nelson during 1988-89, the relevance of which became apparent after the frivolous, extortionary suit was filed. The Plaintiff

in the suit orchestrated by Trombley was a former female friend of Nelson. Counter claims were brought against Trombley, the Plaintiff, her lawyer, and a second female friend, all of whom conspired in a racketeering and extortion scheme to embarrass Nelson and to assist in the objectives of the conspirators attempting to take over the Company.

In an offering circular dated May 22, Trombley secured investors for a new company he co-founded, Advanced Lubricants of America. Lubrizol's fuel additives group provided the literature, product formulation and test data, among other things, to support Trombley's efforts. Two principal references made by Trombley were (1) Ronald Krumm. Trombley indicated that Krumm could be reached at PMC's New York offices and provided a phone number, which was actually Krumm's home phone number as he was no longer employed by PMC. (2) A second reference provided by Trombley was Boston faction leader, Wayne Huizenga, Sr. According to the investors in Trombley's scheme, Roberto Rojas and Jose Gandullia, Trombley held meetings with them at Royalty Yogurt, a company owned by Wayne Huizenga, Sr. and Wayne Huizenga, Jr., both signatories to an investment and "stand-still" agreement signed with the Company in October 1988. Wayne Huizenga Jr. officiated at the meetings with these investors, wherein several hundred thousand dollars were secured for the scheme supported by Lubrizol, the New York and Boston factions.

Trombley used PMC customer lists available to both he and Krumm in an attempt to undermine PMC's business, tortuously interfere with PMC's contractual relationships and created a monopoly for Lubrizol in the lead substitute business for valve seat lubrication and ORI control. Numerous documents, affidavits and other evidence provide proof of this conspiracy against PMC and its founders and shareholders. Trombley also apparently forged product recommendation letters for Advanced Lubricants of America products from letters of recommendation secured for DurAlt FC by Trombley while he was employed by PMC. It was also later discovered that Trombley had business cards printed indicating he was Vice President of Sales and Marketing for PMC. His resume indicated he was responsible for refinery and fuel distributor sales. (Krumm had this responsibility.)

In July 1991 Trombley and Advanced Lubricants of America declared bankruptcy after evidence of his activities surfaced in PMC's investigations and lawsuits were prepared to be served on Trombley. A lawsuit was drafted by the firm, Valdez-Fauli, however, Trombley's whereabouts was unknown. However, in Trombley's bankruptcy papers, eventually secured by PMC and through further investigation, it was established that Trombley went to work as operations manager for Royalty Yogurt while his wife became a store manager for Royalty Yogurt, owned and operated by the Huizengas.

DECEMBER 1989, PMC/PFIZER SIGNED CONTRACT MAKING PFIZER EXCLUSIVE MANUFACTURER FOR PMC PRODUCTS/ KRUMM, WALSH, NEW YORK FACTION OPPOSE DEAL IN ATTEMPT TO WEAKEN PMC MARKET EFFORTS

In December of 1989, Mark Nelson initiated negotiations to make Pfizer the exclusive manufacturer for PMC of its products. The deal was signed in December 1989 and announced on January 2, 1990. This contract allowed the Company to make its products available to large customers who did not have confidence in PMC's financial ability to produce large quantities of the Company's product as a reliable source for such product. As Pfizer was a Fortune 500 U.S. company with revenues of approximately $6 billion,

Pfizer fit the corporate profile that a refiner or other large customer would accept as a vendor of important products that they could rely on as part of their business and marketing strategy. This also eliminated the need for major investments by PMC in manufacturing and distribution facilities and capabilities. The importance of the Pfizer relationship to PMC was thus greatly increased and became more critical to the viability of PMC and its ability to market its products worldwide to major users.

PFIZER MANUFACTURING CONTRACT ANNOUNCED JANUARY 2/ON JANUARY 3 CONSULTANT ALIGNED WITH NEW YORK FACTION ATTEMPTS TO UNDERMINE PMC/PFIZER RELATIONSHIP

On January 3, 1990, a consultant and financial analyst, Barry Gluck, who had been hired by defendant Harold Cerra, sent a memo to PMC expressing his disagreement with closing the PMC New York office which was done as a cost cutting measure. Gluck later contacted Pfizer and made disparaging comments about PMC and the Pfizer relationship to Executive Vice President Donald Farley and also attempted to contact the Chairman and Chief Executive Officer of Pfizer, Mr. Ed Pratt, in an obvious attempt to disrupt the relationship between PMC and Pfizer, Inc. Hal Cerra, in 1989, had taken an adversarial position with the relationship and had, in fact, instructed PMC attorney Stanley Rothenberg to prepare the termination of one of the Pfizer-PMC relationships for consideration by PMC's Board of Directors in an attempt to diminish and disrupt the relationship thus weakening PMC, in a conspiracy to ultimately take the Company over. This effort reached a climax and became an open issue in October of 1989. The Board resolution was blocked by Mark Nelson who understood the critical value to the Company's viability of the PMC/Pfizer relationship. It is believed that Barry Gluck's disruptive calls to Pfizer were directed by Hal Cerra, Bruce Meisel and Reich & Company with whom he was aligned. Defendant Ronald Krumm, a close associate of defendant Hal Cerra sent Mark Nelson a memo at the time of the manufacturing contract discussions with Pfizer, Inc., discussing his opposition to the Pfizer manufacturing relationship.

DURING 1990, PFIZER/PMC DEVELOPS PLANS TO EXPAND RELATIONSHIP - CONSPIRATORIAL FACTIONS ASSISTED BY INSIDE INFLUENCES AT PMC AND PFIZER ATTEMPT TO PREVENT EXPANDED RELATIONSHIP

A series of negotiations and efforts for a greatly expanded relationship between Pfizer and PMC occurred during this period of time, while conspiratorial factions attempted to block the contracts that would expand the relationship and solidify PMC's marketing efforts. The history of these efforts are in the attached exhibit "Pfizer - 1990".

ON JANUARY 29, 1990, PMC ANNOUNCED FIRST MAJOR REFINERY CONTRACT WITH ELF ACQUITAINE. ON SEPTEMBER 5, 1990, RESEARCH AND LICENSING CONTRACT ANNOUNCED WITH ELF

Elf conducted highly successful tests of DurAlt FC or ORI control in 1988 and allowed the data to be included in the PMC/Pfizer SAE paper published in 1989. In 1989 further negotiations ensued between PMC and elf, resulting in the contract announced on January 29 which gave PMC and DurAlt FC technology tremendous credibility in the industry via the elf endorsement.

The second contract announced on September 5, 1990, a licensing agreement for DurAlt FC technology, provided PMC with a major oil company partner to pioneer the use of the unique DurAlt FC technology as the only effective ORI control additive available to the industry. As pointed out in the January 2, 1986, First Boston analysis of Lubrizol's Powershield fuel additive announcement, a major oil company is needed by an additive company to pioneer the development and use of the product for refinery purposes before widespread acceptance of the technology can occur.

The continuing disruptive impact on PMC, its viability, and financial stability raised concerns at elf. Although elf invested substantial money, energy and time in pursuing testing, compatibilizing and refinement of the DurAlt FC technology for their use as an ORI control additive, elf management insisted on development of an elf proto-type as well. elf presented a research report on April 1, 1992 detailing the positive results achieved in their research and testing of DurAlt FC technology. Attached as an exhibit is a lengthy memo dated November 23, 1992, detailing the effects of continuing attacks on PMC as related to the elf relationship.

SEARS/DURALT FC MAJOR MARKET OPPORTUNITY CRUSHED BY CONSPIRATORIAL ACTIONS OF BOSTON FACTION & LUBRIZOL

Due to the market efforts of 1989 and 1990, Sears Automotive in the Boston District, successfully marketed DurAlt FC in a unique marketing program which proved to be highly profitable to Sears. The program was to be expanded to the entire northeast United States and then recommended for national distributorship. Due to conspiratorial factions, including Keith Moon, a PMC employee at the time, the Boston and New York factions with whom he collaborated, and Lubrizol and Clark, the deal was destroyed through product disparagement. The attached exhibits from the chronological allegations will provide background information on the destruction of a multi-million dollar market opportunity with Sears.

PMC MOTORSPORTS SPONSORSHIP AND MARKETING DEAL WITH PAUL NEWMAN AND ADVANTAGE FOODS (DISTRIBUTOR FOR "NEWMAN'S OWN") UNDERMINED BY "MOLE" MOON AND CONSPIRATORIAL FACTIONS

PMC President, Mark Nelson, entered into an agreement with actor/motorsports personality, Paul Newman, which enabled PMC to market DurAlt FC technology through consumer retail outlets using a poster of Paul Newman, his racing car and DurAlt FC. The poster was free with each purchase of an eight ounce bottle of DurAlt FC. Another contract was signed with Advantage Foods, the master distributor of Paul Newman's food line, "Newman's Own". The combined deal represented a $110 million, 10-year contract for the distribution of DurAlt FC and the Newman poster. The endorsement by the highly credible actor and the anticipated revenues from the deal represented a tremendous consumer market opportunity for PMC.

Unfortunately, the ongoing attack on PMC's financial viability, product disparagement and interference with PMC's contracted relationships by conspiratorial factions, once again, prevented the Company from exploiting a major opportunity. Attached are various chronological allegations to provide further insight for the disastrous problems described herein.

THROUGHOUT 1990, A SERIES OF LAWSUITS, TARGETING PMC AND MARK NELSON, WERE FILED TO UNDERMINE AND DISRUPT THE COMPANY (ORCHESTRATED BY CONSPIRATORIAL GROUPS - LUBRIZOL, BOSTON & NEW YORK FACTIONS

The lawsuits, orchestrated by the three conspiratorial factions, included the May 15 suit mentioned earlier filed against Mark Nelson and the Company. Additionally, a suit was brought by New York faction members, Krumm, Wash, Miles, Mills and Mello in New York. Another suit was brought by Mello in New York, and still another suit was filed against Mark Nelson and PMC in Saginaw, Michigan by Krumm, Wash and Miles. Krumm also encouraged litigation against PMC in contacts he made to AMPM Marketing, in Midland, Michigan, the Company's primary advertising agency. Furthermore, evidence exists that New York faction member, Krumm, was instrumental in instituting or encouraging litigation against PMC in 1990-91 with Campbell & Company, Roush Racing and Ricardo Engineers.

Additional litigation or threatened litigation was orchestrated by New York faction members, Henry Geier and Bruce Meisel with investors who made demands for or sued for rescission of PMC stock purchases that were solicited and consummated by Meisel and Geier on behalf of the Company. It was Geier and Meisel who introduced Lubrizol to PMC and DurAlt FC technology in 1985. Geier, in 1990, was caught impersonating a Barron's reporter for a negative story to be run in Barron's magazine about PMC as part of the Lubrizol/Feshbach short selling attack on PMC. It was reported to Mark Nelson by the investigative firm, Lundian Associates, that it was well-known in the New York financial community that Lubrizol and the Feshbachs were involved in a joint attack on PMC and disparagment of its products. In a written report provided in November 1990, Lundian further advised that it was well known that Geier and Meisel were collaborating with Reich & Company and that Al Barbara of Reich & Company was distrusted and aggressive in his tactics with clients for whom he was engaged in public financings.

MULTI-FACETED ATTACK ON PMC AND DURALT FC TECHNOLOGY IN 1990 NEGATIVELY IMPACTS PMC MARKET AND FINANCIAL PERFORMANCE/ STRENGTHENS LUBRIZOL MONOPOLY IN LEAD SUBSTITUTE MARKET

Each conspiratorial faction working with Lubrizol had their own motive, primarily financial gain, for their acts against PMC in support of Lubrizol's objectives to gain a monopoly in the "lead substitute" market. The ultimate ownership by Lubrizol of PMC's patented DurAlt FC technology or the delay of PMC's market entry in able to buy time to develop an alternative technology, was Lubrizol's objective. The conspiratorial factions working with Lubrizol gained financially by manipulating PMC's stock and ultimately by bankrupting the Company and seizing the Company's assets, its patents, for sale to Lubrizol or another entity at substantial profit. Thus, self-interests motivated them to engage in the conspiracy with Lubrizol.

DURING 1991 LUBRIZOL AND ITS CO-CONSPIRATORS DISPARAGED PMC PRODUCTS AND THE COMPANY ITSELF WITH CUSTOMERS, PROSPECTIVE CUSTOMERS, VENDORS AND SUPPLIERS OF PMC

A number of entries in the chronological allegations refer directly to known incidents of these illegal acts against PMC that were uncovered through the Company's investigations. Lubrizol's co-conspirators from the New York and Boston factions also attempted to

prevent PMC from exploiting important contracts, including those with Elf Acquitaine and Paul Newman by manipulating the Company's stock downward and other acts designed to keep the Company in a financially vulnerable state, thus undermining the Company's ability to move forward with key opportunities:

On January 18, 1991, Jim Larson submitted a memo in which he detailed the results of an independent laboratory test demonstrating that Randall Trombley's fuel conditioner, manufactured by defendant Lubrizol, contained in some bottles the Lubrizol product and in other bottles, DurAlt FC. These bottles were sent by Trombley to Lionel Sacks, who noticed a difference in color and submitted the samples to PMC for analysis. Defendant Randall Trombley, a convicted racketeer and extortionist, was using what is known as the "bait and switch" ploy wherein a sample of DurAlt FC would be provided to a prospective customer who would test the product for approval. Once approved, the product shipped to the customer would be the product manufactured by Lubrizol. This tactic was used to unfairly compete with PMC and was part of an overall conspiracy that Lubrizol, Trombley and others engaged in to delay PMC's market entry and financially damage the Company to the point of bankruptcy to ultimately seize the Company's patents. Trombley was supported in this conspiracy not only by Lubrizol but by former officers, employees, directors and investors of PMC, as well as stock brokers and market makers who collaborated with him.

On January 29, 1991, PMC sales representative, David Purdy, secured for Mark Nelson a package of letters from a prospective customer wherein Hydrotex, Lubrizol and Ethyl disparaged PMC products. Lubrizol was the key culprit in the disparagement, as part of an ongoing conspiracy by Lubrizol and its customers to destroy PMC's market efforts and prevent the Company's successful entry into the marketplace and to destroy the Company financially. In this particular example, Hydrotex, Lubrizol and Ethyl conspired together to prevent the emergence of a new Company with a cutting edge technology representing a threat to their market position. This is a clear effort on the part of three independent competitors to carve up the market in direct violation of Federal laws.

On February 20, 1991, Deborah Pilkington reported that a shareholder who spoke to Wynn's, a Lubrizol private label customer, was told by Wynn's that DurAlt FC caused corrosion in a Chrysler fuel system. This allegation was part of a campaign of Lubrizol's and their co-conspirators to disparage PMC's lead product, DurAlt FC and to delay the Company's market entry causing the Company financial damage and ultimately forcing the Company into bankruptcy to seize the Company's patents.

On March 25, 1991, PMC Master Distributor for Michigan, Van Manen Oil Company, provided to the Company an interoffice memo of ValvTech, a Lubrizol private label and PMC competitor in which DurAlt FC was alleged to cause corrosion in Chrysler fuel tanks resulting in fuel filter plugging.

Lubrizol was assisted in this conspiracy by the convicted felon, Randy Trombley, other former employees, officers and directors of PMC, investors, as well as stock brokers and market makers who manipulated the Company's stock. Significant efforts were made by Lubrizol and their co-conspirators to disrupt contract negotiations with Dow Chemical and Pfizer, as well, and to frustrate the Company's efforts to assist Amway in expanding its marketing efforts for Freedom Fuel Additive (DurAlt FC) in Europe, after a successful launch of the product in England under the trade name, Freedom Petrol Additive.

During 1991, it was discovered that Karl Keith Moon, who was involved in the Company's investigations of Lubrizol and its co-conspirators, was also acting as a "mole"

inside the Company for the Boston faction. Moon, later that year, assisted Clinton Allen and the Boston faction in its efforts to undermine and frustrate the Company's contract negotiations with Dow Chemical. The proposed contract would solidify and stabilize the Company and prevent its desruction by Lubrizol and the New York and Boston factions, who sought to gain control of the Company's patents out of bankruptcy.

On April 2, 1991, K. Keith Moon reported to management an in-depth conversation he overheard at the Michigan Petroleum Association Conference in Grand Rapids, Michigan. Moon overheard an employee of ValvTect, a Lubrizol and Dupont private label marketer of fuel additives, discussing acts against PMC by various co-conspirators against the Company's interests. The chronological allegations that follow clearly demonstrate that the planned acts against PMC were carried out.

On April 23, 1991, Jose Gandullia, one of the investors secured with the assistance of Lubrizol, the Boston and New York factions for Trombley's scheme, Advanced Lubricants of America, faxed an inquiry to Keith Moon, requesting verification of information that Trombley had in his resume and financial offering circular. Also attached, as an exhibit is Moon's response to Gandullia. Gandullia and Rojas were threatening to sue Trombley for misrepresentation in the securing of their investment monies. In a tape recorded conversation with Keith Moon, Trombley's business partner, Ray Aquilar, advised Moon, alias Mike Johnston, that Trombley was represented by Huizenga's lawyers at a meeting with Rojas and Gandullia's lawyers in which Huizenga was assisting Trombley because of their long term friendship.

On May 3, 1991, Jerry Van Manen of Van Manen Oil Company provided PMC with a letter regarding his phone conversation to day before with Duane Prince of Coyne Oil, another PMC customer. Price had advised Van Manen that Jerry Nessenson, the President of ValvTech, had told him that PMC had just filed for bankruptcy under Chapter 7, in an attempt on the part of Nessenson and his co-conspirators to destroy the Company's business and to have a highly negative effect on the Company's stock price as the distributors for PMC were also shareholders of the Company.

On May 3, 1991, Duane Prince provided to Mark Nelson a letter verifying Jerry Nessenson's charges made on May 2, 1991. According to Prince, Nessenson not only lied about the Company's financial situation related to filing bankruptcy, but libeled and slandered the officers of PMC by accusing them of taking a "million dollars here and a million there" out of the Company and falsely asserting the Company had lost $10 million in the last year. It was a total falsehood, as the Company had greatly reduced its losses that resulted from the disrupted market launch of fiscal 1990.

On May 3, 1991, Dolores Coy, PMC employee, advised Mark Nelson in a memo that PMC customer Dick Myron had received a package verifying that convicted felon Randall Trombley was selling a product manufactured for Trombley by Lubrizol. Myron told Coy that Trombley's claims for his product were identical to those of PMC's product, DurAlt FC, and also stated that Trombley informed him that his product, like DurAlt FC, contained a "polar molecule". Trombley also advised Myron that Lubrizol manufactured the product for him and that he was being backed by Lubrizol. Myron observed that Trombley's brochures were of the highest quality and contained test data. Myron believed that the brochures and testing were provided to Trombley by Lubrizol. Myron also advised Coy that Wynn's, a fuel additive marketer who private labeled Lubrizol products, visited him. Wynn's disparaged PMC's product, DurAlt FC, saying that there was an injunction against PMC's performance claims for the product. Myron further stated that the Wynn's representative was a national sales manager who was making the same allegations to numerous other prospective clients in Myron's market. The

Plaintiffs allege that Trombley conspired with Lubrizol, using PMC's customer lists, to undermine the reputation of the Company and its products in an attempt to interfere and disrupt the Company's contractual relationships and delay PMC's market entry. It is further alleged that Wynn's and other Lubrizol private label customers conspired with Lubrizol to disparage, disrupt and undermine PMC's contractual relationships and to delay the Company's market entry.

On May 6, 1991, Mark Nelson was advised in a telephone call by Dick Nitsche, President of Alox, the provider of PMC's key ingredient, that he had been told by an individual that PMC was in Chapter 7 bankruptcy. Nitsche refused to confirm or deny that the allegation was made by Nessenson. Also, at this time, Nessenson's company, which was a division of Coppers Chemical, had been purchased by RPM, the parent company of Alox. On the same day, James Larson, PMC Vice President, reported that Alox employee Rich Campeau, would not release the latest shipment of the Company's key ingredient until our check had cleared. This requirement had never been made by Alox, a long time supplier to PMC. Campeau advised Larson that Dick Nitsche had tole him that he had heard PMC was in Chapter 7. Once again, the Plaintiffs allege a concerted act on the part of various co-conspirators to undermine PMC and tortuous interference with PMC's trade and contractual relations.

On May 31, 1991, a package of documents attacking PMC that were being circulated by Don Koehler of Lubrizol and Mike Marianacci of the Stockbridge Partners (Feshbach Brothers) were given to PMC consultant Peter Slater from Dick Valentine of Jiffy Lube. Mike Knox and Dave Parker, PMC employees, met Valentine at an SCCA banquet and Valentine expressed an interest in PMC's products and the marketing of DurAlt FC through Jiffy Lube. A portion of the proceeds from the sale of DurAlt FC through his outlets at Jiffy Lube would go to sponsor his racing team. Clint Allen later learned of the Jiffy Lube contact through Keith Moon and volunteered to help the Company, as Allen just happened to know Valentine, who was located in the Boston area. Soon Valentine's interest diminished substantially and mysteriously. Peter Slater also knew Valentine because of his former role in motorsports with Newman Sharp racing. Slater pressed Valentine for a reason for his diminished interest in making a deal with PMC and, as a result, Valentine provided him with the Lubrizol/Stockbridge documents attacking PMC. Valentine, however, would not tell Slater from whom he had received the documents. The Plaintiffs allege that the documents were delivered to Valentine at the direction of Clinton Allen and Keith Moon to discourage his involvement with the Company, thus denying the Company an opportunity to advance into the market place and causing the Company serious financial damage. Allen's motive was to arrange for deals that would not come to fruition until he had gained control of the Company. The documents received by Peter Slater also proved the collaboration between the Company's chief competitor, Lubrizol and the short sellers of the Company's securities, who worked in a concerted effort and conspiracy to prevent the Company's market entry, while shorting the Company's stock. The effect of preventing the Company's market entry and resultant poor performance and financial distress was designed to enable the short sellers to cover their shorts at lower prices and great profit to the short sellers. In this way, the short sellers would fulfill their own prophecy in shorting the Company's stock because the Company's stock was allegedly priced too high. The motive of the competitor, Lubrizol, was to place the Company in a serious financial difficulty and thus reduce the competitive threat in preventing market penetration by a new and rising competitor.

PMC INVESTIGATIONS OF LUBRIZOL & CO-CONSPIRATORS CAUSE KOEHLER'S DEPARTURE FROM LUBRIZOL/ MIKE MARIANACCI, EMPLOYEE OF FESHBACH "FRONT", STOCKBRIDGE PARTNERS, TO SEEK OTHER

EMPLOYMENT/ KOEHLER AND MARIANACCI CIRCULATED JOINT DOCUMENT ATTACKING PMC IN 1989, 90 AND 91. PMC RECEIVED A COPY OF THE MANUSCRIPT ON MAY 31, 1991

In August 1991, defendant Don Koehler of Lubrizol left employment with Lubrizol. It is alleged that Koehler's separation from Lubrizol was due to the investigations on the part of PMC of Koehler's adversarial and damaging acts against PMC. (Mark Nelson's warning letter of April 17, 1990 to Lester Coleman, CEO of Lubrizol, mentioned only one Lubrizol employee, Don Koehler. A number of other Lubrizol employees, including Wampler and Jacobitis, were directly involved, along with Trombley, in various attacks on PMC. It is important to note that Coleman promised to look into the matter in his letter dated April 26, 1990, after which time Trombley proceeded with his deal with Lubrizol and orchestrated a scandalous lawsuit against Mark Nelson and PMC.)

On August 6, 1991 Mike Marianacci of Stockbridge Partners, a "front" company for the notorious short sellers, the Feshbachs, acquired one share of stock of PMC to enable him to track the Company better and to be on the shareholder mailing list. This made Marianacci a shareholder of record, and shareholders of record receive corporate information more readily than shareholders who hold their stock in street name.

CHARLES JOHNSTON ATTEMPTS TO LOAN PMC $2-3 MILLION WITH THE PATENTS AS COLLATERAL IN CONCERT WITH HUIZENGA AND ALLEN/BOARD REPRESENTATIVE FOR HUIZENGA-ALLEN CONFIRMS OFFER

On August 12, 1991, at approximately 11:00 a.m., Mark Nelson received a phone call from Charles Johnston who advised Nelson that Jim Bonner had advised him that the Company would run out of cash in September, while talking to Bonner in Nelson's absence on August 7. Johnston advised Nelson that they were no longer interested in proceeding with the private placement agreement that had been agreed to be the parties. Instead, he insisted that a loan of $2-3 million be made to the Company by himself, Clint Allen, Wayne Huizenga and perhaps other of the Boston investors, with the patents of the Company as security for the loan. After demanding that Nelson accept the loan concept, Johnston made threats of a shareholder derivative lawsuit against PMC, its Board of Directors and Nelson, and said, "we can get you out of there in five minutes" if you don't cooperate, and accused management of being incompetent. Johnston ended the conversation saying that Leroy Moyer, Board representative for the Huizenga/Allen investment group wished to talk to Nelson the next day. Moyer reiterated Johnston's loan concept with the patents as collateral.

On August 13, 1991, Ricardo Engineering sued PMC for failure to complete payment on tests performed for PMC. These tests were quality assurance tests insisted upon by Ronald Krumm, Chet Walsh, Glenn Rightmire, and Richard Fein. At the time, Mark Nelson objected to the tests as being unnecessary and prohibitively costly. Walsh, Krumm and Rightmire were trying to suggest that various batches of DurAlt FC were inconsistent in their performance capabilities, without any proof upon which to base their conclusions. The tests were forced upon the Company by pressure exerted by the aforementioned individuals, who were undermining confidence in the product on the part of PMC's sales force during the midst of an unprecedented marketing and advertising launch and major staffing up in support personnel to assist the market effort. It is alleged by the Plaintiffs that Krumm, Walsh and Miles deliberately undermined confidence in the product on the part of the sales force and Company's staff to deliberately disrupt the Company during this most critical period and to undermine the Company's market efforts, delay market entry and throw the Company into financial

crisis as a prelude to takeover by themselves and other New York City factions. Walsh, Krumm and Miles deliberately undermined confidence in the product on the part of scientific advisors Rightmire and Fein who assisted them in disrupting the Company's efforts and insisting on the totally unnecessary and expensive tests to disrupt and delay the Company's unprecedented marketing and advertising efforts at that time by challenging the Company's performance claims. This ploy was particularly transparent since a few months prior to the insistence for additional tests, the Company, along with the Society of Automotive Engineers, had published a scientific paper containing test data verifying DurAlt FC performance claims. Extensive tests detailed in the scientific paper had been recently been completed by PMC (in U.S. laboratories), Pfizer, Inc., (at Ricardo Engineers in England), and by a major oil Company, elf Aquitaine of France. The data in the scientific paper published by the Society of Automotive Engineers was deemed highly credible by a high level Ford Motor engine developer who reviewed the paper and who had served as committee chairman for committees reviewing and accrediting draft SAE papers many times in the past. Based on the positive test results achieved with DurAlt FC, the high level Ford engineer certified a list of substantial advertising claims for performance of DurAlt to another Ford Motor Division that had tested the product and was considering a Ford private label marketing agreement for the product with PMC. The aforementioned high level Ford engineer and another high level Ford engineer in the Fuels and Lubricants Division recommended at that time to major U.S. oil companies that sufficient positive data concerning DurAlt FC had been generated and detailed in the paper, that refiners should test DurAlt FC in their own facilities. Because of the aforementioned the scheme of Krumm and his co-conspirators is all the more obvious. During the course of these new, unnecessary and expensive tests, Krumm, his cohorts and other factions with whom they were aligned in New York attempted to take over the Board of Directors of the Company in November of 1989 by withholding a $5 million financing that had been in preparation since January 1989. The attorney involved with the disputed Ricardo testing fees, was Stanley Rothenberg. Rothenberg had been closely associated with Ron Krumm and worked with him on a daily basis after Krumm left Pfizer and started work with PMC in January 1989 opening the New York offices of PMC. The New York office was insisted upon by Harold Cerra, Krumm and other members of the New York faction. Rothenberg remained closely associated with Krumm until Krumm resigned in the summer of 1990 along with his cohorts, Miles and Walsh and began suing the Company frivolously for wrongful termination to bring additional pressure to bear on the Company's finances and to disrupt the Company further. Ultimately, lawsuits were brought by Krumm, Walsh and Miles against PMC in Saginaw and essentially identical litigation was brought against PMC in New York by Krumm, Walsh, Miles, and other members of the adversarial New York faction, William Mills, Joe Mello who had been hired by New York faction leader, Hal Cerra as sales consultants and distributors in the South American, Far Eastern and Middle Eastern markets in 1989. During the period they worked for the Company in 1989, these individuals at great expense to PMC failed to deliver any sales to the Company whatsoever, except "bogus" purchase orders that hurt the Company's credibility, and associations with irreputable individuals including drug dealers, the Condor Group from Columbia who greatly damaged the Company's credibility and substantially hindered and delayed the Company's market efforts and created a financial crisis for the Company. PMC President Mark Nelson directed PMC attorney Stanley Rothenberg to negotiate a settlement of the unpaid Ricardo invoices with the law firm Plunkett & Cooney of Detroit, Michigan, representing Ricardo Engineering. Rothenberg was instructed by Nelson to resolve the matter amicably even if the entire bill needed to be paid, as other data developed at Ricardo for Pfizer which appeared in the SAE paper published in February of 1989 was critical to PMC's efforts with elf Acquitaine and other refiner targets in Europe. Additionally, Amway Corporation, a major customer of PMC, had recently launched DurAlt FC, privately labelled as Amway Petrol Additive, in England with a resounding

success. Amway's plan to expand sales of the additive beyond the successful market launch in England to countries throughout the Western European market and their reliance on the Ricardo Engineering data was well known to Rothenberg and to the New York and Boston factions. The adversarial faction in New York, including Ron Krumm and the adversarial faction in Boston were seeking to delay the Company's market entry, disrupt the Company's operations, drive the Company's stock price down, damage the Company financially and take the Company and its assets, the patents, over from the founders and current management to the detriment of the Company's shareholders. Rothenberg either deliberately or carelessly neglected to stay on top of the situation with Ricardo and a suit was brought by Ricardo against PMC for non-payment of the invoices. When the Ricardo lawsuit was initiated because of non-payment of fees on August 31, 1991, attorney Stanley Rothenberg was advised by the lawyer for Ricardo that they were well aware of the lawsuit brought by Ronald Krumm against PMC. Ricardo Engineering is located in England and would have no way of knowing about Ron Krumm's lawsuit unless Krumm advised them of same. It is alleged that Krumm forced management to allow the contracting of these expensive and unnecessary tests and then, when the Company was unable to meet Ricardo's payment schedules for the tests, Krumm encouraged Ricardo to sue the Company, as he had done with other vendors to whom the Company owed money, including AMPM Marketing and Roush Racing. It is further alleged that Glenn Rightmire, Ron Krumm, Chet Walsh, Van Miles, Hal Cerra and others were conspiring to undermine the Company, damage the Company financially, cause the Company to incur unnecessary costs and disruptive litigation, and ultimately to destroy the Company and seize its patents. As part of their plan, it is alleged that they encouraged the Ricardo litigation to disrupt the Company's efforts with elf and other European refiners, including British Petroleum in England. Krumm had assisted PMC management in making a DurAlt FC presentation to British Petroleum in the Spring of 1989. Furthermore, Krumm and his co-conspirators were attempting to delay and halt Amway's planned expansion from the market success in England to all other Western European markets, relying on the test data developed at Ricardo Engineering by Pfizer in 1988. In fact, in December 1991, Mark Nelson was advised by a Vice President of Amway in the U.S. that a product performance complaint had been filed by an unidentified party with the British equivalent of the Federal Trade Commission, citing the fact that U.S. test data was used to support claims of Freedom Petrol Additive in England. On August 29, 1991, PMC management was made aware of evidence that linked Krumm to a convicted racketeer and extortionist, Randall Trombley, a.k.a. Groomes. (Krumm was named as a PMC reference for Trombley) in a scheme that included PMC's key competitor, Lubrizol, and a member of the adversarial Boston faction, Wayne Huizenga. Lubrizol also had a business relationship with Amway corporation and were selling Amway the oil additive package for Amway's synthetic "Freedom" engine oil. It is alleged that the adversarial New York faction, the adversarial Boston faction, and PMC's competitor, Lubrizol, were conspiring against the Company's interests, using inside information concerning PMC's marketing plans provided to them by employees, directors and legal counsel of PMC.

Lubrizol, at that time, had offices in England and its marketing manager for fuel additives in Europe personally knew researchers at elf Aquitaine, a French refiner, who had conducted successful tests on DurAlt FC in 1988 and were currently conducting successful tests of DurAlt FC under the terms of an option to license contract signed with PMC in the summer of 1990. Another contract had been signed in January of 1990 wherein elf was to add DurAlt FC to its high technology fuels sold in the U.S. market and PMC was to be the exclusive distributor for such fuels in the U.S. market. Elf was also adding DurAlt FC to fuels they delivered to the French car companies for initial "factory fill" of fuel tanks and for qualification tests run by the French auto companies in gasoline engines. elf received two extensions of time for their option to license from

PMC President, Mark Nelson. This was necessitated by the fact that elf was aware of the Company's financial duress and was also aware of the continuing assault on PMC by adversarial factions. Therefore elf was not certain if PMC would survive to be a reliable supplier of a key fuel additive for their vital gasoline marketing strategy in France, and throughout their operations in Europe. Due to this concern, elf expended significant resources in an attempt to develop their own product in the event that PMC did not survive the onslaught of the various factions. elf eventually developed a prototype product of their own as a potential alternative to DurAlt FC. This prototype product may very well become a competitor to PMC's DurAlt FC technology because of the disruptions and delays caused by the Company's adversaries and its competitor, Lubrizol. Prior to this time, according to elf, no other additive existed that could effectively produce substantial reductions in engine octane requirement (ORI). It is alleged by the Plaintiffs that the delay of PMC's market entry and the disruptions of the Company's business by the conspiratorial factions has caused the Company to lose the exclusive opportunity to fill a vital market need of refiners worldwide, caused by the phasing out of environmentally harmful octane boosting additives as gasoline components and the resultant octane shortage and need for additives that reduce engine octane requirement. The Company and its shareholders have therefore suffered irreparable harm and substantial financial damages. It is also alleged that this deliberate delay of the market entry of DurAlt FC technology by these factions has had a direct and negative impact on the U.S. balance of trade deficit as foreign competitors may now come into the market before PMC can establish prominent market position with its patented fuel additive technology.

On August 29, 1991, Mark Nelson provided PMC legal counsel with a memo concerning Mercury Marine, Hal Cerra, Lubrizol, Bruce Meisel, Hank Geier and others. On the same day, Keith Moon provided a memo to Mark Nelson discussing convicted felon, Randall Trombley's, involvement with Lubrizol in a conspiracy against PMC. Also on that day, James Bonner provided a memo, at Nelson's request, regarding a phone conversation he had with Roy Dickinson of Pfizer, in which Dickinson said that Lubrizol would make an excellent partner for PMC. At the time of Dickinson's comments, he was negotiating on behalf of Pfizer to expand Pfizer's partnership with PMC.

LEROY MOYER ATTENDS BOARD MEETING/PRIVATELY INVITES MARK NELSON TO VISIT BOSTON TO MAKE A DEAL HE IS "COMFORTABLE WITH"

On September 16, 1991, at approximately 6:30 p.m., Mark Nelson met Leroy Moyer, Board representative for the Huizenga/Allen group at Bay Valley Inn's lounge area. Moyer had asked to talk to Nelson confidentially in a telecon the week before about a financing proposal from Allen, Charles Johnston, and in which Wayne Huizenga was also to be involved. Moyer, after some initial conversation, was asked by Nelson what the proposal was. Moyer stated the proposal included (1) a reorganization of the PMC Board, eliminating several members from the founders group, but that Brian Taylor and Nelson would remain with Nelson possibly as Chairman. The Allen/Johnston/Huizenga group would appoint a new CEO, operating officer and financial officer. (2) They would invest approximately $3 million: $1 from Johnston, $1 million from Huizenga, and $1 from Clint Allen and others from the Boston group for restricted stock below market prices. Moyer urged Nelson to keep their discussions secret from other Board members and to come to Boston secretly "to make a deal he was comfortable with".

On September 17, 1991, the Board meeting was held and during the portion of the meeting when potential financings were discussed, Moyer did not introduce his proposals

or suggestions for a meeting in Boston to discuss financing by the Boston investor group. After the Board meeting, Moyer asked Nelson if he could talk to Nelson in his office and restated his request that Nelson come secretly to Boston to make a "deal he was comfortable with". Nelson advised Moyer that he should consider a proposal that was good for all the Board members and shareholders rather than attempt to benefit only a small group of individuals.

Mark Nelson rejected the unethical offer made by Moyer, at which time Moyer reacted that Nelson be be close to a strategic alliance deal (Dow Chemical). Later that day, Keith Moon attempted to contact Dow Chemical New Ventures in attempt to learn about the progress of the Dow Chemical/PMC deal and was caught in the act by Deborah Pilkington. Moon was then suspended, pending an investigation by management. During October, November and December of 1991, the Boston faction and its allies attempt to stop the Dow Chemical deal in favor of a loan from the Boston group with the patents as collateral. (See various allegations during this period of time.)

October 10: Stewart Warner

On December 20, 1991, David Parker provided a notarized statement to Mark Nelson stating that Ron Krumm, when he first joined PMC, during a dinner meeting in Saginaw at the Sheraton Inn with Parker and his wife, had stated that Mark Nelson was not qualified to be President of PMC. Parker further stated that Krumm's actions that followed demonstrated his intention to take control of the Company. It is alleged that Ron Krumm was conspiring even before becoming an employee of PMC, with Hal Cerra and his co-conspirators to disrupt the Company's unprecedented market launch, with an increased staff and increased budget to move the Company forward to profitability. Co-conspirators, Ron Krumm, Hal Cerra and others sought to undermine the entire effort, creating financial crisis, destroy the Company's momentum and out of the disaster they created, seize the Company and its assets to the detriment of all shareholders and in violation of their fiduciary responsibilities to the Company and its shareholders. It is also alleged that the conspirators sought to undermine and depose PMC's President, Mark Nelson, who was viewed as a key impediment to their schemes and plans.

IN 1992, PMC PRESIDENT, MARK NELSON, WARNS BOSTON FACTION LEADER, WAYNE HUIZENGA, OF EVIDENCE IMPLICATING HIM IN CONSPIRACY WITH LUBRIZOL, CONVICTED FELON AND OTHER CONSPIRATORIAL FACTIONS/ REACTION TO WARNING: ALL-OUT ATTACK TO TAKE OVER THE COMPANY, STOP INVESTIGATION AND FTC COMPLAINT, DESTROY COMPANY AND SEIZE PATENTS

The following allegations and evidence highlight the all-out attack that was launched by the conspiratorial factions to complete the takeover and destruction of the Company and to prevent the founders from pursuing a complaint with the Federal Trade Commission, to head off litigation by the founders and the Company against Lubrizol and the Boston and New York factions. The illegal and destructive proxy battle killed PMC's new contractual relationship with Dow Chemical, severely damaged the Company's credibility with all of its customers, corporate relationships, the financial community, and damaged the Company's (stock) market value. After the proxy fight every action of the conspirators was calculated to complete the destruction of the Company, halt the investigation and FTC complaint, and ultimately bring about the destruction of the Company and the seizure of the Company's patents out of bankruptcy.

On January 8, 1992, a letter was sent from Bauer Investigations to Mark Nelson which contained a synopsis of the conspiracy against PMC.

On January 15, 1992, despite all the disruptions, Mark Nelson signed for PMC a contract with Dow Chemical with an option to make, use and sell PMC products in the United States and certain other countries around the world. The deal called for option payments by Dow Chemical to PMC of $1.75 million over 18 months with the potential for tens of millions of dollars of royalty payments upon exercise of the option. This deal was vital to PMC's ability to access and penetrate the U.S. refinery industry with its fuel additive technology. It was also vital to the financial viability and ultimate financial success of the Company, its shareholders and founders.

A letter was sent to Wayne Huizenga, Sr. by Mark Nelson on January 21, 1992, expressing the Company's concerns about an attempt on the part of the Huizenga/Boston group, including defendants Clint Allen and Leroy Moyer to illegally and in violation of their stand-still agreement between the Huizenga group and PMC, to take over PMC. Other concerns raised in the letter to Huizenga related to the Huizenga group's support of convicted felon, Randall Trombley, who was also acting in collaboration with PMC's competitor, Lubrizol, in various attacks on the Company and the founders in an attempt to undermine PMC's market efforts and to cause the Company and its founders substantial financial harm and loss of credibility. The letter also expressed concerns about the activities of K. Keith Moon (without mentioning Moon's name), who had been collaborating inside the Company to illegally secure confidential inside information and to disrupt the Company's market activities. The letter to Huizenga was accompanied by documents which verified the facts supporting the Company's allegations. The entire package was sent for overnight delivery to arrive on January 22, 1992.

On January 27, 1992, PMC President, Mark Nelson sent a letter to the President and the Chairman of Advest, Inc., an investment banker of PMC, expressing concerns about adversarial acts on the part of Advest Vice President, Stuart "Scott" Whitlock and former Vice President and Director, Clint Allen, against PMC, its founders and shareholders. Nelson alleges that Whitlock and Allen were collaborating with others in direct violation of Advest's fiduciary responsibility to the Company in an attempt to take PMC over, to damage the Company and to seize its assets.

On January 28, 1992, a scheduled Board meeting of PMC took place in the Company's Saginaw offices. In advance of the meeting, a Board book was sent to all members of the Board which included a two-page letter from Bauer Investigations which described in a synopsis an ongoing conspiracy against PMC and its founders and shareholders. It was also announced that Bauer Investigations would be represented at the Board meeting. At the beginning of the meeting defendant Leroy Moyer started the discussion by stating that unless the investigation being conducted by management was stopped that shareholders he knew would sue the Company and Board of Directors.

On February 4, 1992, the day following the Dow Chemical announcement, the Company received a faxed letter from attorney James Blosser representing Wayne Huizenga, Sr. (Boston faction) in which he attacked PMC management and the Board of Directors, suggesting management and the Board should be ousted and sued. He also attacked the Company's ongoing investigation of the conspiracy against PMC, its founders and shareholders. He threatened that shareholders known to Wayne Huizenga might sue the Company. It is alleged that the letter was sent to intimidate the founders and Board of Directors that were copied and to force the Company to discontinue its investigations into adversarial acts against the Company which included evidence that linked Wayne Huizenga and his family to convicted felon Randall Trombley who with the support of

Huizenga's family entered into a scheme with Lubrizol to disparage PMC, its products and founders and delay the Company's market entry.

On the same day, the Company received a letter from the legal counsel for Advest, Inc., an investment banker for the Company, in which the lawyer, a Senior Vice President of Advest, Mr. Lee G. Kuckro, denied that Clint Allen, former Vice President of Advest, and Scott Whitlock, current Vice President of Advest, were attempting to undermine and take over PMC and threatened to sue PMC if the Company repeated the allegation. (On June 18, 1992, Keith Moon admitted in depositions that the proxy fight was launched from the Boston Advest, Inc. offices in a meeting led by Stewart "Scott" Whitlock.)

On February 10, 1992, suspended employee, Keith Moon, who was under investigation by the Company for conspiring to disrupt the Company's market efforts, disrupt the Dow Chemical negotiations by providing inside information to the adversarial Boston faction, and for charges of sexual harassment of female employees in his attempts to seek out inside information, faxed a letter to PMC's offices requesting proxy information from the Company and announcing his intention to replace the Board of Directors and management in a proxy battle.

On February 25, 1992, Mark Nelson and Brian Taylor of PMC accompanied by Gary Rabold of Dow Chemical met with Dr. Gilbert Chapelet of elf in Detroit. Chapelet was in Detroit attending the International Society of Automotive Engineers' annual conference. Chapelet advised Nelson, Taylor and Rabold that due to PMC's serious financial crisis and difficulties with adversaries that elf had developed a prototype fuel additive to compete with PMC's DurAlt FC at the insistence of Andre Duvall of elf. Duvall was highly skeptical that PMC would survive its difficulties and therefore, Duvall recommended elf develop a competitive product for elf's own needs and for the needs of other prospective refiner customers. However, according to Chapelet, Duvall was very much impressed that Dow Chemical, through its licensing agreement with PMC, could provide the DurAlt FC technology to elf and was willing to meet with Dow Chemical and PMC for further discussions. Chapelet promised to arrange the meeting as soon as possible and to provide at the meeting all of the DurAlt FC test data developed by elf at great expense to elf research. PMC had the right to the data because of the option to license agreement entered into by elf and PMC in 1990. It is alleged that Lubrizol and the adversarial groups from Boston and New York had seriously damaged and set back PMC's efforts to provide DurAlt FC to elf for its own use in its gasoline and further caused elf to develop an alternative product which potentially could compete with PMC in the oil refinery market.

On April 1, 1992, the day the Amway/PMC expanded relationship was announced, Keith Moon called Don MacDonald of Amway asking for the specifics of the contract and made disparaging comments about PMC and Mark Nelson and advised MacDonald of the proxy fight and solicited Amway's proxy in a clear attempt to tortuously interfere with the important contractual relationship with the Company, disrupt the Company's relationship, cause the Company material financial damage, damage the reputation of the Company and its founders, delay the Company's market entry and to destroy the Company and seize its assets, the patents.

It was also reported on April 9, 1992 to Mark Nelson that on April 8, Keith Moon had contacted David Purdy, a sales representative of the Company with whom the Company had a contractual relationship. Purdy was the sales representative for the Company's largest oil jobber in Michigan. Moon attempted to undermine and tortuously interfere with the contractual relationship between PMC and Purdy and thus with PMC and Van Manen Oil Company, who he threatened to contact. Moon also undermined, defamed,

libeled and slandered the character and reputation of Mark Nelson, President and co-founder. Moon, in his telecon with Purdy advised that Jim Larson may be able to keep his job with the Company if he took a pay cut. Larson shortly thereafter came to Mark Nelson and advised that he did not wish to receive the $30,000 worth of stock which was part of his salary, and thus cut his own salary down to $50,000 per year. This act demonstrated Moon's deliberate tortuous interference with the contractual relationship between PMC and its employee and his indirect intimidation of said employee.

On May 21, 1992, Mark Nelson and William Wenk, accompanied by James Larson, David Parker and A. Richard Nelson met with Alox Corporation in Niagara Falls, New York. In attendance for Alox were outgoing President Dick Nitsche, who was retiring but remaining as a consultant to Alox, and incoming President Steve Miller, both of whom had worked with PMC's founders for many years. Alox Corporation provides the key ingredient in PMC's fuel additive technology. PMC has the exclusive rights for the compound. There were essentially three items on the agenda for discussion in the meeting. (1) various technical, production and quality assurance matters, (2) Alox is a wholly owned subsidiary of RPM Inc. RPM is a large conglomerate comprised of many individual business units including Alox. At least two other units had been discussed as candidates to distribute PMC's finished products to various markets worldwide. Alox was very enthusiastic about the prospect of assisting PMC and expanding its business through other RPM companies as it would enable Alox to increase its business with PMC. (3) Mark Nelson and William Wenk discussed PMC's business strategy of establishing strategic corporate alliances with major corporations to utilize the resources of major international companies for manufacture and distribution of the Company's products worldwide. Nelson and Wenk discussed some of the strategic alliances the Company had developed, including contracts with Pfizer, Amway, Dow Chemical and elf, a major oil company in France. Both Dick Nitsche and Steve Miller had been involved with PMC in the ongoing business activities associated with the aforementioned companies. It was then suggested by Mark Nelson that PMC would be interested in exploring the potential of an expanded business relationship with Alox and the conglomerate that owned Alox, RPM. Various concepts were discussed, including the sale of PMC's treasury stock to Alox or RPM, a joint venture, and a possible merger and acquisition of PMC by RPM. Alox was aware of the fact that PMC's patents were issuing worldwide and that there was significant interest in PMC's fuel additive technology. On the other hand, Alox's process patents to develop PMC's key ingredient for its fuel additive technology had already expired. Therefore the patents owned by PMC could provide Alox and RPM the ability to protect the use of their expired process patents as it relates to the use of Alox compounds as fuel additive ingredients. All parties agreed that there was an excellent strategic fit between RPM, Alox and PMC, and Nitsche and Miller enthusiastically agreed to set up a meeting at the earliest possible date with RPM's merger and acquisition department at their headquarters in Ohio. They further agreed that they would personally attend the meeting and recommend that the two companies enter into accelerated negotiations in an attempt to bring about a deal in the best interests of both parties. Later that day, Nelson learned that the proxy materials of Charles Johnston and his cohorts had been received by mail by a number of shareholder that very same day. The proxy materials of Charles Johnston contained highly inflammatory and libelous materials that defamed the Company, the Board of Directors and the founders. It is alleged that Charles Johnston and his cohorts published proxy materials so slanderous, vicious and outrageous that it is clear that Charles Johnston was acting to destroy not only the credibility of the founders but was also clearly attempting to destroy PMC and all of the Company's corporate relationships with (conservative) major companies. It is further alleged that the Boston faction, New York faction, Lubrizol and their co-conspirators, including PMC insiders and employees, had been ruthlessly and viciously attacking PMC, attempting to destroy the Company for several years. Both Nitsche and Miller had been PMC

shareholders for a number of years because they understood the validity of the Company's technology and believed the Company would ultimately become highly successful in providing its patented fuel additive technology to markets including refiners and other customers worldwide. Later that week, Mark Nelson called Nitsche and Miller to discuss the date of the meeting being arranged with RPM at its headquarters. Nitsche and Miller advised Nelson that they had received the proxy materials and that given the vicious and libelous nature of the attack on the Company that it would be impossible for them to pursue the opportunity. James Bonner and Brian Taylor had been advised by Nelson of his plans to discuss a new strategic business relationship with PRM and Alox. It is alleged that Charles Johnston and his co-conspirators launched their vicious, illegal and outrageously libelous proxy attack to destroy the momentum the Company had gained in solidifying its position and ensuring the Company's success through a number of major new contracts with Fortune 500 major U.S. companies. It is further alleged that Charles Johnston and his co-conspirators were attempting to destroy PMC and take the Company over and seize the Company's assets to the detriment of the founders and the Company's shareholders.

On May 22, 1992, PMC filed a lawsuit in Federal court against Charles Johnston, Keith Moon, Elliott Feiner and others charging them with conspiracy with Clinton Allen and others who had signed a stand-still agreement with the Company in which they agreed not to attempt to gain beneficial owners of more than 25% of PMC, directly or indirectly, until after October 1993. The lawsuit also charged Johnston, Moon, et. al. with numerous violations of SEC Rule 14a-9 for using libelous, slanderous and false statements in a proxy fight to secure votes. The lawsuit also contained a motion for a temporary restraining order to halt the proxy fight.

In May of 1992, Mark Nelson filed a personal libel lawsuit against Charles Johnston, Keith Moon, et. al. due to the libel, slander and defamation of Nelson in the proxy materials and news media releases published by the conspirators. In a telephone conversation with Charles Johnston around the same time, Johnston said to Nelson, "I have destroyed your credibility". The public libel and defamation of Nelson was leveled against him in retaliation for Nelson's unwillingness to cooperate with the conspirators in their attempt to take PMC over. Nelson had been warned by Barton Roe and Brian Taylor that unless he resigned and terminated the FTC investigation he would be publicly embarrassed and defamed. The libel and slander attack on Nelson also targeted his wife, his family, and his wife's family for public humiliation, all of whom were shareholders and would receive Johnston's proxy materials. Brian Taylor, in fact, said to Nelson on the telephone in a threatening way, "I am sorry you and Marilyn have to be embarrassed". This threat was made by Taylor when Nelson reiterated to Taylor that the phone call made by Roe, at Johnston's direction, was extortion to force Nelson to withdraw the FTC complaint and halt management's investigations of the conspirators. The threatened public exposure and resultant embarassment and destruction of Nelson's business career concerning the Schwenzer matter was merely a continuation of the extortion conspiracy behind the Schwenzer lawsuit in the first place. The timing of the lawsuit which was filed four days before Nelson's wedding was a deliberate attempt on the part of the conspirators to disrupt Nelson's wedding and to force Nelson to abandon his investigation of the conspiracy to destroy the Company and to force Nelson's acquiescence to the conspirators' demands to relinquish control of the Board to them.

On June 2, 1992, Dow Chemical announced to PMC that they had decided not to continue their option agreement with PMC. It was made clear to Mark Nelson in a meeting with Gary Rabold and Dr. Roger Hornby prior to the decision, that the scandalous public statements and proxy materials of Charles Johnston and his co-conspirators had produced substantial negative feedback at Dow Chemical, whose headquarters, top

management and Board of Directors were 15 miles away from PMC's offices in Saginaw. The advocates at Dow of the Dow Chemical/PMC contract were placed in an untenable position related to making requests to spend approximately $1.5 million (for proposed testing for Amoco and Unocal), as well as an additional $250,000 option payment to PMC, and to pay other related Dow costs for the next phase of the Dow option agreement. It is alleged that this sensitive stage of the Dow/PMC relationship was totally undermined by the destructive impact of Charles Johnston's illegal, vicious and destabilizing proxy attack.

On June 29, 1992, Mark Nelson sent a letter to James Blosser, General counsel for Huizenga Holdings, requesting a meeting with Wayne Huizenga regardless of who prevailed in the proxy fight. Nelson was convinced, and had evidence that Huizenga was behind the proxy fight in violation of his stand still agreement with the Company. However, Nelson was fearful that Huizenga, using Charles Johnston as a "front man" planned to destroy PMC regardless of who won the proxy fight. Nelson, in the interests of all shareholders, hoped to convince Huizenga that such a course of action would create serious problems for Huizenga and his co-conspirators and that all factions should put their differences aside and work to repair the damages done to PMC and assure the Company's success. In a telephone conversation between Nelson and Blosser at the same time, Blosser agreed that such a meeting may be in the best interests of all concerned, and agreed to discuss the matter with Clinton Allen and Wayne Huizenga.

On August 19, 1992, Dr. Gilbert Chapelet of elf arrived in Saginaw and had dinner with Mark Nelson. On the following day, Chapelet met with Charles Johnston, Keith Moon, et. al., the new management of PMC. Chapelet had meet earlier in the day on August 19 with Amoco Gasoline Marketing in Cleveland, Ohio, concerning a proposed research project between elf and Amoco that was directly related to octane requirement increase control, the key focus of PMC's fuel additive technology. At the meeting with Charles Johnston, et. al., Chapelet sought assurances the pricing for PMC's fuel additive technology, quoted by previous management, would be preserved by new management. The preservation of the price quotations was critical to PMC's chances of securing elf's business. Some time later, Chapelet advised Nelson that Charles Johnston had treated him indifferently and had failed to confirm in writing, as promised, the preservation of the previous price quotations, thus jeopardizing the business opportunity with elf. This development represented a severe blow to the timing and viability of PMC's market entry with major oil refiners. It is alleged that Charles Johnston deliberately disrupted and potentially destroyed a long-standing relationship with elf in which the Company had benefitted through exhaustive and expensive research elf had conducted on PMC's fuel additive technology. Further, elf was PMC's first major oil company contractual relationship and would have provided PMC its entry point into the critical major oil refinery market. (See Mark Nelson's file memo dated November 23, 1992.)

On August 31, 1992, Charles Johnston, Acting Chief Executive Officer of PMC, sent a letter to PMC shareholders containing false and defamatory statements about past management and staff in further retaliation against the founders group and female employees.

On September 3, 1992, the new PMC management released their letter to shareholders of 8/31/92 to the news media, citing the possibility of bankruptcy and the pending lawsuits against PMC, and stating that the suits represented $7.5 million in potential liabilities. They also publicly criticized the agreement signed by past management with Pfizer, Inc. Charles Johnston, Karl K. Moon, et. al. attempted to justify their inability to advance the business of PMC due to the alleged problems cited in the release. They also reiterated their intentions to pursue claims against prior management. It is alleged that

Johnston, Moon, et. al. were attempting to mislead the public concerning their true intentions about the future of PMC. They were, in fact, reneging on their promises to shareholders in their proxy materials to refinance the Company. They were also greatly inflating the liabilities underlying the frivolous lawsuits brought by Krumm, Walsh, Miles, Mills and Mello. Additionally, they were attempting to undermine PMC's expanded contractual relationship with Pfizer, Inc. Further, they were continuing a pattern of libel, slander and defamation against the founders and former administrative staff of the Company, in an attempt to blame the founders for damage they themselves had caused the Company, and deflect public attention from the fact that they were preparing to complete the destruction of the Company, as predicted by the founders prior to and since the takeover.

On September 24, 1992, the trial of Ronald Krumm vs. PMC and Mark Nelson began in Saginaw Circuit court before Judge Lynda Heathscott. In Johnston's letter to PMC shareholders, dated August 31, 1992, he claimed that the lawsuits of Krumm and his colleagues represented $7.5 million in potential liabilities to PMC. Johnston further stated that due to these and other liabilities, the Company may file bankruptcy and that he was going to loan the Company $1.5 million with the patents as security.

On October 2, 1992, Mark Nelson sent a letter to Charles Johnston charging Johnston with attempting to "take a dive" in the Ronald Krumm trial as part of Johnston's plan to bankrupt the Company and seize the patents. Nelson also provided a point by point rebuttal to the slanderous charges leveled by Johnston against the founders group and Nelson in his letter of August 31 to shareholders. Nelson advised Johnston that he had filed complaints with multiple Federal agencies against Johnston and his co-conspirators and that the intended to seek damages against Johnston and his co-conspirators for PMC shareholders amounting to tens of millions of dollars. Nelson accused Johnston of firing three female employees and others in retaliation for bringing a sexual harassment lawsuit against Johnston's crony, Karl K. Moon. Nelson further accused Johnston of deliberately destroying PMC's corporate relationships and ultimately, the Company itself, while blaming it all on the founders.

On October 14, 1992, attorney Tom Gallo, representing Johnston, Moon, et. al. sent a letter to Vic Mastromarco, attorney for Mark Nelson. Gallo recommended the litigants enter into negotiations to settle "any and all disputes among the parties". Gallo, however, requested, as a sign of good faith, that Nelson dismiss his libel suit without prejudice as a consideration for entering into negotiations to settle "any and all disputes among the parties". It was understood that if the negotiations to settle the claims were unsuccessful, Nelson could reinstitute is libel suit.

On December 9, 1992, Charles Johnston, et. al. ostensibly acting for PMC, filed a complaint in Federal Court in Bay City against Mark Nelson, Otis Nelson, A. Richard Nelson, Marilyn Nelson, Deborah Pilkington, Andrew Pilkington, and Marvin Tamaroff.

During this period of time, and up to the present time, the financially powerful conspirators attempted to crush any resistance on the part of the founders group to their schemes and ultimately prevent shareholders from receiving any financial or business information pertaining to the Company. In fact, the Company's subsequent 10Q financial filings with the SEC were withheld from shareholders who requested them. Finally, some shareholders paid a Washington-based service company, Disclosure Inc., $57 to receive some of the financial information of the Company that had been filed with the SEC. The Company's financial disclosures (See September 1991 10Q) revealed that the $7.5 million in "undisclosed liabilities" due to lawsuits, alleged by Charles Johnston in his August 31, 1992 letter to shareholders, were non-existent. These "phantom"

liabilities were used as an excuse for Johnston to place the Company into Chapter 11 Bankruptcy.

It is believed by the founders that the Chapter 11 reorganization plan to be submitted by Johnston will be rejected by a number of the creditors associated with the conspiracy against PMC, thus causing the liquidation of the Company and the sale of the patents to satisfy the creditors, including those engaged in the conspiracy against the Company. It is further believed that Johnston and his co-conspirators will be the purchasers of the patents for a nominal amount of money and will then sell them for their personal profit without any benefit to shareholders. See the following attached exhibits:

Jan. 20, 1993: Terry Maynard's request for shareholder lists

Feb. 1, 1993: Received Sept. 10Q from Disclosure, Inc.

Feb. 3, 1993: Maynard's second request

Feb. 3, 1993: Chapter 11 release

Feb. 3, 1993: Saginaw News article - "patents used as collateral"

Feb. 4, 1993: Ogden response to Maynard's letter

Feb. 12, 1993: Mark Nelson press release

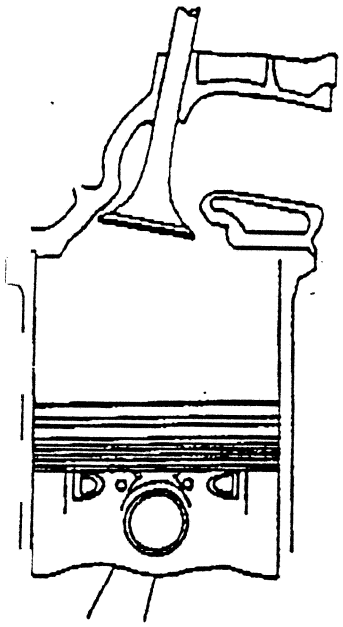
Feb. 19, 1993: Bankruptcy attorney response to Maynard's letter

Mar. 12, 1993: Received word from Gilbert elf will market its own product

Mar. 16, 1993: Highland Appliance bankruptcy story, which we predict will parallel PMC, and list of creditors from PMC bankruptcy papers - check mark denotes creditors aligned with Charles Johnston

WHAT IS O R I ?

ORI IS OCTANE REQUIREMENT INCREASE.



TYPICAL

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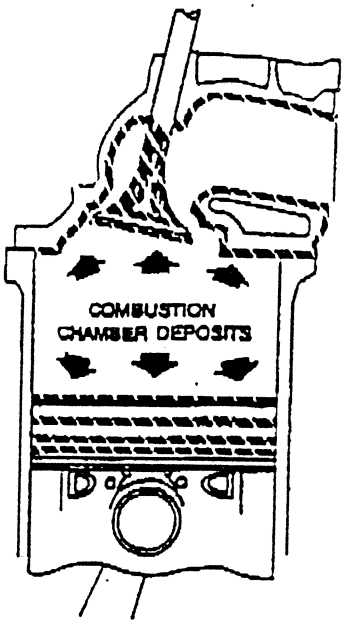
ORI



- NEW ENGINE - 0 MILES
- NO DEPOSITS
- OR = 82 $\frac{R + M}{2}$

- 5 - 10,000 MILES
- LAYER OF DEPOSITS
- OR = 89 $\frac{R + M}{2}$

ORI RESULTS IN:

- ENGINE KNOCK ON REGULAR GASOLINE
- INCREASED USE OF PREMIUM GASOLINE
- REDUCED FUEL ECONOMY WITH "KNOCK SENSOR" CARS
- LESS EFFICIENT ENGINE DESIGNS

DURALT® TECHNOLOGY REDUCES ORI BY 70% BY LIMITING THE FORMATION OF COMBUSTION CHAMBER DEPOSITS.

EXHIBIT LIST
OVERVIEW OF ATTACK BY LUBRIZOL AND ITS ALLIES ON PMC

ORI PACKAGE

1.	CHART	WHAT IS ORI?
2.	July 1988	Results of elf's test of DurAlt FC for ORI
3.	Jan. 29, 1990	ORI & DurAlt Package to shareholders: Life on Knife's Edge Wall Street Journal "Gasoline Firms Push Cure" Octane Week: "Texaco, others..." Octane Week: Interview with Mark Nelson
4.	Mar. 19, 1990	Octane Week: "Octane Crunch Forecast in Mid-1990s for Refiners"
5.	Apr. 30, 1990	Octane Week: "Refiners, Automakers Differences Aired in Dearborn" (Colucci/GM)
6.	Nov. 2, 1990	Freedonia - Predicts strong additives growth
7.	Feb. 11, 1991	Oil & Gas Journal: "Additives to have key role in new gasoline era"
8.	Mar. 18, 1991	Oil Daily: "Octane Requirement Decrease Additive Might Be Next Hot Item"
9.	Apr. 1, 1991	"GM says use cleaner gas"
10.	May 13, 1992	Octane Week: Interview with Brian Taylor

Lubrizol's Private Label Additive Distributors - list

1985:

11.	June 6, 1985	Letter to Hal Cerra stating that Hank Geier reports Lubrizol has expressed a strong interest in PMC.
12.	Aug. 20, 1985	Letter to Geier stating the latest development with Lubrizol is "curious"

1986:

13.	Jan. 2, 1986	Crowell, Weedon report on Lubrizol's Powershield
14.	Jan. 6, 1986	First Boston report on Lubrizol

15.	Jan. 10, 1986	Letter to Steve Cumings, re Mercury Marine contract ("no-compete" listed as contract provision)
16.	Feb. 24, 1986	Mercury Marine agreement
17.	Feb. 24, 1986	Mercury Marine announcement and Saginaw News article
18.	May 16, 1986	First Boston report on Lubrizol with "sell" recommendation
19.	May 28, 1986	Mark Nelson's notes re Reich & Company's shorting of PMC stock "to maintain an orderly market"
20.	June 1986	Chemical description of Lubrizol's Powershield
21.	Sept. 29, 1986	Lubrizol's (Don Koehler) letter to Harley-Davidson disparaging DurAlt FC
22.	Oct. 1986	Motor Boating & Sailing article re PMC agreement with Mercury Marine
23.	Oct. 1986	Richard Thiel article and transcript of telephone conversation between Keith Moon & Thiel
24.	Oct. 13, 1986	Letter from Mercury Marine terminating contract
25.	Oct. 15, 1986	Transcript of telephone conversation between Moon and Lubrizol
26.	Oct. 16, 1986	Transcript of telephone converation between Moon and Art Mains of Mercury Marine
		Lubrizol/Mercury Marine documents obtained from "discovery" process
		List of damages caused by Mercury Marine/Lubrizol
27.	Nov. 3, 1986	PMC letter to James Caldwell, EPA regarding concerns of test procedure
28.	Nov. 5, 1986	Castle Products (Lubrizol private label) disparages Harley Davidson (PMC private label) product

1987:

29.	Apr. 1987	Crusader Marine service bulletin both PMC and Lubrizol products
30.	Apr. 27, 1987	U.S. Oil Week: "Lead substitutes harmful, not effective, study shows"

31.	June 30, 1987	GM AC Spark letter re test results showing DurAlt FC has no adverse effect on fuel filters
32.	Sept. 4, 1987	Mark Nelson memo regarding Lubrizol disparagement of PMC product as reported by Total Petroleum Research
33.	Oct. 6, 1987	Larson's memo regarding call to Jerry Allsup, NIPER. (A/F ratio in EPA testing)
34.	Oct. 27, 1987	Memo from Larson regarding ValvTect's disparagement of PMC product
35.	1987	Klave's Marina package of letters and documents
36.	1987	Questions prepared to ask Nessenson of ValvTect
37.	1988	Partial of report from R. Trombley regarding garbage companies he is contacting about DurAlt FC - states Huizenga will not help unless he has controlling interest in PMC
38.	March 15, 1988	Texaco service bulletin endorsing ValvTect
39.	Mar. 20, 1988	Trombley report on ValvTect violations
40.	Mar. 24, 1988	Trombley letter to Florida Division of Standards regarding ValvTect violations
41.	Apr. 13, 1988	ValvTect memo disparaging DurAlt FC regarding the EPA test
42.	May 8, 1988	DurAlt FC "substantially similar" letter
43.	May 10, 1988	Note from Hank Geier re First Boston's limited partnership with First Brands (Lubrizol private label)
44.	July 1988	OMC Service Bulletin cautioning not to use 4-cycle valve seat recession additives with 2-cycle engines
45.	Aug. 5, 1988	Larson's memo regarding a conference call with Jerry Allsup and Joe Colucci about the ORI benefits of DurAlt FC
46.	Aug. 31, 1988	Trombley's order for 10 drums of DurAlt for Steve Hansford. The drums were never recovered when Hansford became deceased. Believed to be in Trombley's possession and the product used as samples to sell Advanced Fuel Conditioner.
47.	Sept. 26, 1988	ValvTect memo disparaging DurAlt FC through Mercury Marine suit and Klaves Marina
48.	Oct. 6, 1988	Moon's memo regarding Lubrizol's disparagement of DurAlt FC through E.T. Lubricants

49.	Oct. 25, 1988	Letter from Tamboo regarding problems caused by the use of ValvTect gas additive
50.	Nov. 4, 1988	Trombley's memo regarding County Sanitation's endorsement of DurAlt FC, stating that Huizenga used to own that company. Trombley later circulated the same endorsement letter for his own company, Advanced Lubricants of America. The signature of Allan Bunker is different on the two letters.
51.	Nov. 30, 1988	Al Smith's, Ford Motor Company, letter regarding PMC's SAE paper

1989:

52.	1989	Package of documents regarding Gil Clark disparagement
53.	Feb. 13, 1989	PMC/Mercury Marine announcement settling lawsuit
54.	Feb. 13, 1989	ValvTect letter to "Michigan Gasoline Marketer" disparaging PMC
55.	Feb. 27, 1989	SAE package of documents, including: Press release on SAE conference PMC/Pfizer SAE paper Letter to Max Rumbaugh of SAE regarding disparagement at the SAE conference by Clark/Lubrizol Response letter from the SAE Mark Nelson's notes regarding the SAE conference disparagement Lubrizol's discussion of PMC's SAE paper PMC's written response to Lubrizol's discussion
56.	1989	Ford Motor Company package of documents. including: Allegations from lawsuit regarding Ford Al Smith's claims letter Letter to Ford's CEO regarding DurAlt FC/Lyn St. James sponsorship Interoffice memo regarding Dick Baker's help with refinery contacts, including list of contacts Draft of Ford private label contract Letter to Len Pounds backing out of Ford private label Press release on Lyn St. James sponsorship Letter to Lionel Sacks, stockbroker, (name removed), from manager of Ford's Chemical Engineering Department
57.	Mar. 30, 1989	ValvTect memo disparaging PMC's product
58.	May 18, 1989	Memo stating Lubrizol falsely claimed their rebuttal to PMC's SAE paper was an "official SAE rebuttal paper"

59.	May 25, 1989	Memo from Larson regarding Lubrizol's Don Koehler approaching a lab technician about a valve seat recession test on a competitive product (technician suspected the product was DurAlt FC). Koehler stated that Lubrizol may stop marketing their Powershield because of the established side effects.
60.	June 19, 1989	Memo from Mark Nelson to Ron Krumm regarding negative feedback on PMC's racing programs.
61.	Sept. 29, 1989	Randy and Debbie Trombley's resignation letter
62.	Oct. 21, 1989	Tohatsu letter recommending DurAlt FC
63.	Dec. 6, 1989	Clint Allen's letter recommending reorganization of PMC's Board of Directors
64.	1989-90	Randy Trombley's literature, developed by Lubrizol, for his product Advanced Fuel Conditioner, designed to duplicate PMC's product and undermine PMC's business.

1990:

65.	1990	Pfizer chronology from allegations
66.	1990	Elf chronology from allegations
67.	1990	Sears chronology from allegations
68.	1990	Newman/Sharp - Advantage Foods chronology from allegations
69.	Mar. 8, 1990	D & B on Trombley's company, Advanced Lubricants of America
70.	Mar. 27, 1990	Letter to Steve Small regarding Lubrizol/Feshbach package of documents being circulated to PMC customers disparaging PMC and its products and notarized affidavit from Joe Egan, PMC distributor.
71.	Apr. 1990	News article that ValvTect was sold to RPM
72.	Apr. 3, 1990	Moon's memo regarding Caljet, Inc. who stated negative news about PMC was going to be put into magazines and that parts of PMC's SAE paper was invalid.
73.	Apr. 16, 1990	Barron's magazine package, including allegations and letter to Barron's editor and response
74.	Apr. 17, 1990	Letter to Lester Coleman, CEO of Lubrizol, complaining of Koehler's activities

75.	Apr. 26, 1990	Coleman's response
76.	May 2, 1990	Ad response showing Koehler contacted Heavy Duty Trucking magazine for information on DurAlt FC
77.	May 7, 1990	Moon's list of Union Oil companies PMC has had problems with
78.	May 21, 1990	Tohatsu letter discontinuing recommending DurAlt FC. Nessenson of ValvTect is copied on the letter
79.	May 22, 1990	Trombley's resume and offering circular Package of news clippings regarding Trombley's conviction for racketeering and extortion
80.	June 16, 1990	Copy of Trombley's recommendation letter for Advanced Lubricants from County Sanitation - attached also is November 1988 letter Trombley secured from County Sanitation recommending DurAlt FC.
81.	July 9, 1990	Letter from NASD, delisting PMC's stock
82.	July 20, 1990	Copies of Trombley's recommendation letter and test results for Advanced Lubricants by M. J. Perrotta Waste Services, Inc. and nearly identical letter of Feb. 17, 1989 recommending DurAlt FC. Signatures, however, vary quite a bit.
83.	Sept. 28, 1990	Letter from Mark Nelson to Lonnie Smrkovski regarding Tohatsu and Jerry Nessenson
84.	Fall 1990	Transcript of telephone conversation between Keith Moon [alias Mike Johnson] and Linus Jackobitis of Lubrizol
85.	Fall 1990	Transcript of telephone conversation between Keith Moon [alias Mike Johnson] Roy Larson, engineer for Trombley's Advanced Lubricants of America.
86.	Oct. 11, 1990	Richard Nelson memo regarding Amoco meeting - Gil Clark disparagement
87.	Nov. 7, 1990	Transcript of telephone conversation between Keith Moon [alias Mike Johnston] and Ray Aguilar, partner of Trombley. (see page 40 referral to Wayne Huizenga)
88.	Nov. 28, 1990	Draft complaint prepared by PMC attorneys against Trombley and Advanced Lubricants of America
89.	Nov. 28, 1990	Lundian report
90.	Nov. 28, 1990	Report by Lonnie Smrkovsky on the tortuous interference of business by Lubrizol and others

1991:

91.	Jan. 18, 1991	Test results of two samples of Trombley's Advanced Fuel Conditioner, one of which actually contained DurAlt FC
92.	Jan. 29, 1991	Hydrotex/Lubrizol/Ethyl package of letters, circulated to disparage PMC products
93.	Feb. 20, 1991	Report from a shareholder of PMC who stated that Wynn's (private label of Lubrizol) was disparaging DurAlt FC
94.	Mar. 25, 1991	Memo from Van Manen Oil Company, a customer of PMC, who received ValvTect memo dated May 9, 1990 disparaging DurAlt FC, using the Gil Clark/Lubrizol disparagement
95.	Apr. 2, 1991	Keith Moon's memo regarding overhearing a conversation with ValvTect representatives disparaging PMC.
96.	Apr. 23, 1991	Moon's letter to Jose Gandullia regarding Trombley's resume and offering circular
97.	May 3, 1991	Dee Coy's memo about a phone conversation with Dick Myron, PMC customer, who stated Trombley was making claims for his product identical to the claims of DurAlt FC
98.	May 3, 1991	David Coyne's (PMC customer)memo about Nessenson's call to him on May 2 that PMC was going "Chapter 7"
99.	May 3, 1991	David Coyne's memo that Nessenson had called and apologized for making the erroneous statement about PMC the day before.
100.	May 6, 1991	Jim Larson's memo to Mark Nelson regarding his call from Alox Corporation that PMC was going into Chapter 7
101.	May 31, 1991	Package of documents Peter Slater, PMC consultant, received from Dick Valentine of Jiffy Lube in which the Feshbach's Mike Marianacci and Lubrizol's Don Koehler disparaged PMC and its products.
102.	Aug. 29, 1991	Moon's memo regarding Trombley and his involvement with the Huizengas and investors Rojas and Gandullia.
103.	Aug. 29, 1991	Mark Nelson's memo to legal counsel about Mercury Marine/Lubrizol activities against PMC
104.	Oct. 10, 1991	James Larson's letter to Stewart Warner Corporation
105.	Dec. 20, 1991	David Parker's memo about his dinner with Ron Krumm in early 1989.

1992:

106.	Jan. 8, 1992	Letter from Bauer Investigations containing a synopsis of the conspiracy against PMC
107.	Jan. 21, 1992	Warning letter to Wayne Huizenga
108.	Jan. 27, 1992	Warning letter to Advest, Inc. regarding the adversarial activities of Stuart Whitlock and Clinton Allen
109.	Jan. 28, 1992	Board meeting minutes
110.	Jan. 31, 1992	Response from Huizenga's attorney
111.	Feb. 3, 1992	Announcement of the Dow/PMC deal
112.	Feb. 4, 1992	Response from Advest, Inc.
113.	Feb. 7, 1992	Memo on Amway FTC/Ricardo
114.	Feb. 10, 1992	Moon's letter initiating the proxy battle
115.	Feb. 27, 1992	Memo regarding Koehler leaving Lubrizol and Marianacci leaving the Feshbachs
116.	Apr. 1, 1992	Elf/PMC/Dow test results
117.	Apr. 9, 1992	Memo from David Purdy regarding phone call from Moon
118.	June 3, 1992	Dow press release cancelling its deal with PMC
119.	June 18, 1992	Excerpts from depositions of Moon, Johnston and Allen, in Bay City Federal Court suit
120.	June 29, 1992	Mark Nelson's letter to Huizenga's attorney requesting a meeting regardless of who wins the proxy fight
121.	June, 1992	Marketing research report by the Freedonia Group of Cleveland, Ohio, identifying DurAlt FC as a product that will reduce engine deposits and meet the new 1990 Clean Air Act Amendments. This marketing report is available to the industry at large, and Lubrizol and others undoubtedly have seen a copy of it.
122.	Aug. 19, 1992	Mark Nelson's memo regarding visit from Dr. Chapelet of Elf
123.	Aug. 31, 1992	Charles Johnston's letter to shareholders
124.	Oct. 2, 1992	Mark Nelson's point-by-point rebuttal to Johnston's letter

125.	Oct. 14, 1992	Letter from Gallo agreeing to attempt to settle "any and all claims among the parties"
126.	Dec. 9, 1992	Founders group served with frivolous complaint
127.	Jan. 20, 1993	Terry Maynard, Shareholders Committee to Protect the Patents and Assets of Polar Molecular Corporation, request for shareholder lists
128.	Jan. 25, 1993	A Letter of Credit from Banco de Brasil for $547,800 for an order from Petropar, the national oil refinery of Paraguay was received by Johnston for Polar products. Seven days later, Johnston threw the Company into bankruptcy stating there was no business for the Company. Also attached is the original Letter of Credit from Paraguay's oil company from January 1992, prior to the takeover.
129.	Feb. 1, 1993	September 1992 10Q received from Disclosure, Inc.
130.	Feb. 2, 1993	Johnston's bankruptcy filing.
131.	Feb. 3, 1993	Terry Maynard's second request for shareholder lists, for the purpose of initiating a shareholder derivative suit against Johnston personally
132.	Feb. 3, 1993	Press release on filing Chapter 11 Bankruptcy
133.	Feb. 3, 1993	Saginaw News article wherein David Parker stated that Johnston had loaned the Company $300,000 with the patents as collateral.
134.	Feb. 4, 1993	Richard Ogden's response to Terry Maynard's request for the shareholder lists
135.	Feb. 12, 1993	Mark Nelson's press release regarding "new management's" betrayal of promises to shareholders
136.	Feb. 19, 1993	Bankruptcy attorney's reponse to Terry Maynard's request for shareholder lists
137.	March 12, 1993	Memo regarding lost opportunity for DurAlt FC with Elf Acquitaine of France.
138.	March 16, 1993	Highland Appliance bankruptcy story - predict parallel to PMC and Creditor list from PMC bankruptcy papers - check mark denotes creditors aligned with Charles Johnston
139.	April 22, 1993	Johnston's Plan of Reorganization and liquidation of Polar in order to convert PMC assets to NAFA.

140. Apr. 30, 1993 — Brian Taylor's memo to Charles Johnston, on NAFA letterhead concerning business opportunities and customers of PMC which are being converted to NAFA.

141. May. 4, 1993 — NAFA memo from Brian Taylor to Mike Tarafa, PMC agent in Costa Rica, advising him that NAFA now has the exclusive rights to all PMC products and customers.

142. May 11, 1993 — Motion filed in bankruptcy court to remove Johnston et al from management of Polar because of their unlawful activities and diversion corporate assets to NAFA.

143. May 12, 1993 — Lawsuit filed by Mark Nelson and the Committee to Save PMC in Federal District Court against Johnston, NAFA et al.

144. May 13, 1993 — Federal Bankruptcy Judge's Order removing Johnston et al from management of PMC, and appointing a Trustee to run the affairs of the company.

145. Summer 1993 — Package of three documents which show the individuals and competitors, Lubrizol and ValvTect, who attempted to purchase the patents of the Company from the Trustee.

- June 22, 1993 transcript of bankruptcy hearing in which the Trustee's counsel informed the Court that Lubrizol was one of the companies who was interested in purchasing Polar's technology.
- Letter from the Trustee's office offering Polar's technology for sale to ValvTect.
- Excerpts from the Trustee's billings filed with the bankruptcy court which list others who spoke with the Trustee regarding the purchase of the patents, i.e., Lubrizol, ValvTect, Huizenga's representative, Leroy Moyer, Barton Roe, Amway, James Bonner, Jerry Finch (Finch works for MASI Ltd., a merger & acquisition company in Chicago whose Boston affiliate is Advest, Inc., a PMC investment banker whose Vice Presidents Clinton Allen and Scott Whitlock brought in Huizenga and Johnston as investors in PMC. It was at the offices of Advest Inc. that Johnston and Moon met to set up the proxy fight in 1992.)

146. Oct. 12, 1993 — Trustee's lawsuit filed against Johnston, Taylor et al for unlawful conduct and converting PMC's customers and technology to NAFA.

147. Dec. 7, 1993 — Mark Nelson received a confidential briefing, including a history of the unique opportunity for PMC and DurAlt FC due to the product's ability to reduce combustion chamber deposits and octane requirement increase. Chapelet advised Nelson that no other product was able to perform this vital fuel additive function, but due to the attack on PMC concluding in the 1993 bankruptcy of the Company, Elf Acquitaine made a decision to go forward with a technology they had been developing in parallel to their efforts with

DurAlt FC. According to Chapelet, this caused PMC to lose its vital and unique leadership for this fuel additive technology and cost PMC its opportunity with a major oil company, Elf Acquitaine. Chapelet concluded that other competitors would now come into the market, including Lubrizol, and that any further delay would be "fatal" to DurAlt FC.

148. Jan. 3, 1994 — Documents produced by Robins, Kaplan attorney Robert Montague in his deposition, which include a documents in which Robins Kaplan set up a bankruptcy file for PMC forJohnston just two weeks after the takeover date, and Montague's August 26 memo to Johnston in which he discusses various options to bankruptcy the Company and siphon off its assets.

149. Jan. 4, 1994 — Excerpt from Taylor's deposition by the Trustee's lawyers in which he commits perjury by denying he is an officer of AFD Technologies or that he is manufacturing fuel additives. Also attached are Taylor's fuel additive manufacturing notifications to the EPA as COO of AFD Technologies. One of the notifications is for the AirClean product - see also attached a newpaper article for AirClean, Petropar's name for DurAlt FC in Paraguay since its original order for DurAlt FC in January 1992, prior to the takeover.

150. Dec. 5, 1994 — Plan of Reorganization submitted by Mark L. Nelson and the Committee to Save Polar, and the Judge's Order confirming our plan, which was closed on December 16, 1994.

151. Jan. 19, 1995 — Memo regarding Mark Nelson's phone conversation with Stefano Crema of BASF during which Crema stated that BASF is currently selling its detergent package to Johnston, Taylor et al.

152. Jan. 1995 — It was discovered in the files of Polar, returned to Michigan from Boston, that Johnston, Taylor et al. signed a non-disclosure agreement on January 1, 1993 with BASF's Executive Vice President.

153. Jan. 19, 1995 — Memo regarding PMC's Distributor, Joe Egan's call from Jim Ferguson, claiming that Taylor will provide Egan a product that does everything that DurAlt FC will do and incorporates a BASF detergent package. The research to combine BASF detergent package with DurAlt FC occurred before the June 30, 1992 takeover by Johnston.

154. Feb. 1995 — Upon the return of the files and records of the Company to Saginaw, a package of correspondence between Johnston, Parker et al to Richard Valentine of the MBA Group for the Jiffy Lube business opportunity, was found. Prior to the takeover, PMC had been abruptly told by MBA Group that they were no longer interested in doing business with PMC

for some mysterious reason. PMC consultant Peter Slater was able to learn from Valentine that his decision had something to do with the package given to him, presumably by Clinton Allen and/or Keith Moon, that was being distributed by Lubrizol and the Feshbach Brothers, in an attempt to slander PMC. However, after Johnston took over PMC on behalf of the Huizenga/Allen/Advest group (who were involved with Lubrizol) the MBA Group resumed business discussions with the new management group of PMC.

Feb. 1995

A review of the current state of the market for DurAlt FC fuel additive technology has revealed the following facts:

The U.S. Environmental Protection Agency is considering mandating the use of fuel additives in gasoline for all U.S. refiners that would reduce combustion chamber deposits and octane requirement increase. PMC intends to comment, along with Ford Motor Company and other industry elements, in favor of this regulation. It has been verified by PMC that it was the intent of Congress that technology such as DurAlt FC would be added to gasoline under the Clean Air Act Amendments passed by Congress in October, 1990. This fact was well-known to Lubrizol, other competitors and corporate raiders who attempted to wrest control of PMC, and finally succeeded in doing so on June 30, 1992. Evidence now exists that Lubrizol and the corporate raiders with whom it was aligned over several years are now attempting to infringe on the patents, trade secrets and technology of PMC, in order to continue to compete unfairly with the reorganized PMC.

In foreign markets, all foreign refiners are being forced to eliminate the octane booster, tetraethyl lead, and to reduce emissions caused by burning of diesel fuel, as well. Due to its unique performance features, DurAlt FC can reduce the need to use tetraethyl lead because of its ability to reduce engine octane requirement, and its ability to reduce emissions from gasoline and diesel fueled engines. Virtually a world-wide market, due to environmental pressures, now exists for DurAlt Fuel Conditioner technology. The reorganized PMC, due to substantial market delays caused by the disruptive tactics of Lubrizol and its allies, must now advance rapidly into the market while defending its rights to the DurAlt FC technology from infringement from the same powerful forces that have beseiged the Company for nearly ten years.

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CONFIDENTIAL

POLAR MOLECULAR CORPORATION
4901 Towne Centre Road
SAGINAW
Michigan 48604
USA

For the attention of Mark L. NELSON

RD/F/RCH/PDT-GCL/fb 88/107

Solaize, le 26 Juillet 1988

Marvin, ELF's
- First tests = Duralt
Significant control
of ORI!!
— Mark —

Dear Mark,

You will find attached, the results obtained with your DURALT FC at 500 ppm by volume, on :

- inlet valve cleanliness,
- octane requirement increase control.

The control of ORI is very significant, but DURALT FC has no effect at all on the valve cleanliness : if you look at the picture of the valves of Run n° 6, deposits are even covering part of the stem.

Valve cleanliness is now very critical in Europe and any gasoline additive has to decrease very significantly the weight of deposits; we are currently testing additives reducing weight of deposits by 70 to 90%.

In our opinion, DURALT FC cannot be introduced as it on the European market as a detergent additive.

The test on motor bikes are still in progress and I will let you know as soon as I will get the results.

Sincerely yours.

G. CHAPELET

Copie : P. MULARD

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OCTANE REQUIREMENT INCREASE CONTROL

Road test - Keep clean - 10 000 km

		ORI *	
		no additive	with DURALT FC
Leaded Gasoline	R 21 GTS n° 5	4.6	0.8
U.L.	R 21 GT6 n° 6	1.5	0.3

* average value on the 4 cylinders

CONCLUSION :

As compared with a gasoline without additive, DURALT FC has a significant effect on the octane requirement increase control.

EXCLUSIVE DISTRIBUTOR'S AGREEMENT

This Agreement entered in and between POLAR MOLECULAR CORPORATION, a corporation organised and registered under the laws of Utah, having its principal office at 4901 Towne Centre Road, Suite 310, Saginaw, Michigan 48604 USA, referred to as "POLAR", and ELF FRANCE, a corporation organised and registered under the laws of FRANCE having its principal office at Tour Elf, 2,Place de la Coupole, La Défense 6, 92400 COURBEVOIE, (France), referred to as " ELF ".

WITNESSETH

P M C CONFIDENTIAL

1 **TERM OF AGREEMENT**

This Agreement shall become effective as date of signatures and shall expire on the 30 th of June 1991.
This Agreement may be extended from time to time if the parties shall agree to such extension by letter or by télégram confirmed by letter provided, however, that in no event shall any extension expire later than 5 years after the expiration of the first term hereof.

If orders for products are accepted and shipments are made later after the expiration of this agreement, such acceptances and shipments shall in no event not constitute a renewal of this Agreement.

2 **EXCLUSIVE DISTRIBUTOR**

Polar shall be the exclusive distributor for Elf for Racing Fuels specified in exhibit A. This list of products can be extended to similar products as a function of the market.

ELF grants to Polar the exclusive privilege to market, sell and distribute the Products to all purchasers within the United States of America for use in trucks, automobiles, boats, and motorcycles.

3 **DURALT**

It is agreed between the parties that the Racing Fuels delivered by Elf to Polar shall be bulk treated with Duralt Fuel Conditioner, referred as Duralt, unless otherwise specifically notified by POLAR.

The products shall be bulk treated in France with Duralt by Elf who shall bear the corresponding costs.

4 **QUANTITIES**

Polar expressly agrees to purchase and pay for a minimum of two hundred fifty thousand gallons of the products by 30 th of June 1991. And thereafter during each fiscal twelve months period that an increase of minimum 10% a year will be performed.

However, this increase can be reviewed in July 1991, and in July of each other year taking into account the results of each marketing period and the specific actions of Elf in the USA to promote its products.

In the event that Polar fails to purchase the minimum number of gallons of the products as is specified herein, and if nevertheless the Agreement is renewed, this Agreement will be automatically converted from an exclusive distributorship agreement into a non exclusive distributorship agreement.

5 **PRICES AND DISCOUNTS**

The prices and discounts are specified in exhibit B for Elf products, and in exhibit C for POLAR Duralt. Duralt's prices can be amended by Polar from time to time. However, that changes in wholesale prices shall apply only to orders shipped thirty days after the publication of such changes.

Polar agrees to pay, in US $, for the products at Elf's wholesale prices as shown in exhibit B attached hereto, which prices take into account a share of 50 : 50 of the net margin. Ex (1) the prices for 110 RON and 118 RON.

These prices shall be amended, either higher or lower, by the same percentage of increase or dicrease in the cost of a barrel of leaded premium in Rotterdam Market. Such increase(s) or decrease(s) in the price of Elf's products as is specified herein, shall take effect when there is a change in excess of more than ten (10) % in the cost of a barrel of leaded premium in Rotterdam market and upon the expiration of three months after written notice of such price change has been sent by either party hereto to the other.

Any and all taxes, charges and expenses incurred by Polar in connection with the importing, marketing, sale and delivery of Elf's products shall be borne solely by Polar.

Any and all taxes, charges and expenses incurred by Elf in connection with the importing of Duralt shall be borne solely by Elf.
POLAR will sell the product in the U.S.A.

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(1) See EXHIBIT B

6 **SOURCES OF SUPPLY**

Unless a written agreement to the contrary, Elf, at its option, from time to time may, but shall not be obligated to, either can the products to be furnished by one or more of Elf's subsidiary, affiliated or associated corporation, or direct Polar to purchase the products directly from said subsidiary, affiliated, or association corporation.

7 **POLAR PROMOTE SALES**

Polar agrees to promote fairly but aggressively the sale of the products purchased from Elf hereunder, ant to carry at all times if reasonably obtainable a sufficient stock of the products for the duration of this Agreement to insure prompt supply for all reasonable demands.

8 **ELF PRODUCTS ONLY TO BE SOLD**

Polar will not sell or attempt to sell other goods which are similar to those furnished by Elf.

9 **POLAR NOT TO MAKE WARRANTY**

Polar shall make no stipulations or conditions in the nature of a warranty on the products.

10 **PROPRIETARY RIGHTS**

It is agreed between the parties that each shall own any and all proprietary rights in and to the patents, trade names, marks, symbols, logos, services, ideas and materials, covered under this Agreement which relate to the products in the case of Elf, and to Duralt, in the case of Polar.

Products must only be sold under the Elf name.

11 **ACCEPTANCE OF ORDERS. SHIPMENT**

All orders from Polar are subject to acceptance by Elf at its principal office or at its office of Solaize (France). All orders from Elf are subject to acceptance by Polar at Saginaw, USA.

- All Duralt to be shipped pursuant to the terms of this Agreement shall be FOB the Port of Detroit Michigan. USA, according to the " incoterms ". Elf shall pay for all shipping, duties, customs, agents, insurance, export and/ or import taxes, fees, or charges, and other related costs (including any taxes imposed by the country of importation) and agrees to take title to the Duralt upon delivery to the carrier.

  Unless otherwise notified by Elf ten days before shipment, Polar shall designate the carrier.

- Polar shall order the products by written purchase order or by telephoned, telefax or cable order confirmed by a written purchase order sent to Elf within seven days of such telephoned, telefax or cable order.

  All products to be shipped pursuant to the terms of this Agreement shall be minimum shipment of one container load each i.e. eighty drums containing 20 cubics meters each and shall be FOB from Solaize / Fos sur Mer in France according to the " incoterms ". Polar shall pay for all shipping, duties, customs,agents, insurance, export and/ or import taxes, fees or charges, and other related costs (including any taxes imposed by the country of importation) and agrees to take title to the products upon delivery to the carrier. Unless otherwise notified by Polar ten days before shipment, Elf shall designate the carrier.

12 **PAYMENTS**

Elf agrees to pay, in US $, for Duralt's prices. The payment terms for Duralt shipped are net cash within thirty days of presentation of invoice and bill of loading.

Polar agrees to pay in US $ for products's Elf prices. The payment terms for products shipped are net cash within thirty days of presentation of invoice and bill of loading.

13 **ATTENDANCE FROM ELF**

Elf agrees during the duration of this Agreement to
- furnish to Polar, in the English language, a reasonable amount of brochures, fact sheets, published technical data and literature relating to the products to be used as selling and marketing aids
- maintain telephone contact with Polar and be available to answer questions about the products and to give marketing and selling advice.

14 COOPERATION BETWEEN ELF AND POLAR

Polar agrees to timely obtain at its sole cost and expense all necessary import licences, approvals, and other documents that may be required now or in the future by any governmental authority in the USA in order to import the products or export Duralt to France.

Elf agrees to timely obtain at its sale cost and expense any approval, document or licence which may be required now or in the future by any governmental authority of France in order to import Duralt or export the products to the USA.

Polar represents that the products are purchased for the purpose of exportation to the USA, and Polar covenants that the products will be shipped to that destination , and shall furnish, if required by Elf, a landing certificate duly executed by the customs authorities at the port of importation, certifying that the goods have been landed and entered at the port.

Elf represents that the Duralt is purchased for the purpose of importation into France, and Elf covenants that the Duralt will be shipped to that destination , and shall furnish, if required by Polar, a landing certificate duly executed by the customs authorities at the port of importation, certifying that the goods have been landed and entered at the port.

Both Polar and Elf agree to cooperate with each other and use their best efforts to furnish to the other in a timely manner all information and documents which may be required to obtain any of the licences, documents or approvals required hereunder.

15 MARINE AND MARINE WAR RISK INSURANCE

When consistent with the terms of sale under any order, and in the absence of written instructions to the contrary, Marine and Marine War Risk insurance will be placed by Elf on all shipments, the premium for which insurance shall be for Polar's account.

16 TITLE TO GOODS

To the extend permitted by law, until each of the products delivered under the terms of this Agreement has been paid for in full, Elf shall retain title to the products; however, all risk of loss and liability for transportation and storage, taxes and duties shall transfer in accordance with the terms of sale.

17 **WARRANTY AND ADJUSTMENTS**

There is no warranty, express or implied, applicable to the products as between Polar and Elf. In the absence of prior written permission from Elf, Polar is not authorized to make any adjustments or replacements of products for Elf's account.

POLAR only shall be liable for all damages or defective products, and shall have no claim whatever on Elf and so POLAR must insure against a third party claim.

18 **FORCE MAJEURE**

Either party shall not be hold liable for delay or failure in shipment or delivery of the products or Duralt due to war, fire, flood, strikes or other labor disturbance, accidents, Act of God, governmental order or requirement, interruption or shortage of materials, transportation facilities or energy supply ou due to any cause, similar or otherwise, beyond its control, and either party shall be excused from deliveries to the extent that deliveries may be prevented by force majeure.

19 **NO GENERAL AGENCY**

It is agreed by the parties hereto that both Polar and Elf are independent contractors. Nothing herein contained shall be construed as creating a situation wherein either party expressly or impliedly as to any person whatsoever change their status as herein set forth.

- Both parties hereto are engaged is an independent business and are solely responsible for the employement acts and omissions, control and direction of its agents and employees, and shall conduct its business in compliance with all rules, laws and regulations of governmental authority within their respective countries.

- No agency, joint venture or partnership is hereby created by the parties to this Agreement. No representations will be made by either party that would create apparent agency, joint venture or partnership. Neither party shall have the authority to act for the other in any manner to create obligations of debts that would be binding on the other, and neither party shall be liable for any obligations or expenses whatsoever of the other. The only relationship between the parties hereto shall be that of independent contractor. Neither party shall be liable for any act or omission of the other or any employee of the other.

20 **DOMICILIATION**

Any notice, consent, or approval required under this Agreement shall be in writting sent by registered mail, postage prepaid, or by telefax or cable (confirmed by such registered mail) and addressed as follows:

If to Elf
Elf France, Centre de Recherche, Elf Solaize, B.P.22 69360 St. Symphorien d'Ozon, France
If to Polar
Polar Molecular Corporation ...

All notices shall be deemed to be effective on the date of mailing. In case any party changes its address at which notice is to be received, written notice of such change shall be given without delay to the other party.

21 **SAVING CLAUSE**

- The invalidity of any particular provision of this Agreement shall not affect the other provisions hereof, but the Agreement shall be construed in all respects as if such invalid provision or provisions were omitted.

- This Agreement contains the entire agreement and understanding between the parties and supersedes all collateral , oral or written agreements previously made. There are no covenants, representations or warranties not herein expressly set forth. This Agreement shall not be changed orally, but only by an agreement in writting, signed by the party against whom enforcement of such change or modification is sought.

22 **ASSIGNMENT**

The assignment of this agreement by Polar is subject to the written approval of Elf.

23 **CANCELLATION**

Either party may cancel this Agreement at any moment without notice for any at this agreement committed by the other, but without prejudice to the rights arising prior to such cancellation.

24 **OBLIGATIONS OF POLAR UPON CANCELLATION OR TERMINATION**

Upon cancellation or termination of this Agreement, Polar shall immediately cease holding himself out as an authorized distributor of the Elf's products and shall promptly:

- terminate all telephone and business directory listings which refer to Elf as an authorized distributor of the products

- permanently remove all signs and other advertising which refer to Elf as, or imply that Polar is an authorized distributor of Elf.

If Polar fails to remove these signs and advertising materials, Elf shall have the right to do so at reasonable times and taking reasonable steps to avoid damage to the premises. All signs or other property which belong to Elf shall be returned to Elf. The disposition of signs or other identification furnished under a separate agreement with Elf shall be governed by that Agreement.

The termination of this agreement or the failure of the parties to agree to any renewal thereof for any reason shall give no right to any compensation payment but shall not effect any other rights of either party already accrued under this agreement.

25 **LAWS AND COURT**

This Agreement shall be governed by laws of FRANCE. The parties hereto agree that any dispute relating to or arising under this Agreement shall be submitted to the court of commerce of PARIS. FRANCE (tribunal de commerce), and the parties hereto consent to personal juridiction in such court.

ELF FRANCE

ELF FRANCE Tour ELF Place de la Coupole Cedex 45 92078 PARIS LA DEFENSE

Pierre BERTRAND
ELF FRANCE
Chef de la Division
Industrie - Transports - Energie

POLAR MOLECULAR CORPORATION

OPTION AGREEMENT

AGREEMENT, dated as of September 5, 1990, between Polar Molecular Corporation ("Polar"), a corporation organized under the laws of the State of Utah, with a principal place of business at 4901 Towne Centre Road, Vanguard Building, Suite 310, Saginaw, Michigan 48604, U.S.A., and Elf France ("Elf"), with a principal place of business at Tour Elf, cedex 45, 92078 Paris La Défense, France.

Whereas Polar is the owner of certain technical information and patent right relating to a product manufactured and sold by Polar under the name "DurAlt Fuel Conditioner".

Whereas Elf wishes to evaluate such product to determine whether Elf shall obtain a license to use such technical information and patent rights under the terms outlined in Exhibit III.

Now therefore Polar and Elf agree as follows :

I. DEFINITIONS

A. "Product" shall mean the product currently manufactured or sold by Polar under the name "DurAlt Fuel Conditioner" as more fully described in Exhibit I.

B. "Patent Rights" shall mean the patent listed in Exhibit II.

C. "Technical Information" shall mean all information and know-how, owned, acquired or developed by Polar relating to the Product, including formulations, manufacturing processes, and analytical methodology used in the testing, assaying, analysis, manufacture and packaging of the Product.

II. SUPPLY OF INFORMATION

A. Promptly after the Execution date of the Option Agreement, Polar shall supply Elf with Technical Information and samples of the Product.

B. During the period of this Option Agreement and for the life of the patents thereafter, Elf shall hold in confidence and not use, except for the purposes of the Agreement, the Technical Information.

The obligations of confidentiality and non-use hereinabove shall not apply to Technical Information which :

- was in the possession of Elf before the disclosure hereunder as evidenced by recipients written records; or
- is at the time of such disclosure, or thereafter becomes part of the public domain through no fault of Elf;or
- is acquired by Elf after disclosure hereunder from a third party who did not obtain it under a continuing obligation of confidence from Polar.

Should this Option Agreement terminate and Elf elect not to execute the License Agreement, then Elf shall return non-consumed samples and all original copies of written Technical Information, and return or destroy all copies thereof.

C. From time to time during the Term of this Agreement, Polar agrees to make its personnel available in U.S.A. at no cost, to consult with representatives of Elf for reasonable periods not to exceed two (2) weeks in total.

III. OPTION

A. Polar hereby grants an option to Elf to obtain a license to use the Technical Information and Patent Rights under the term outlined in Exhibit III (LICENSE AGREEMENT).

B. The term of this option shall be from the date of execution until March 1, 1991.

C. Said option shall be exercised with the term by the signature by Elf of a copy of the License Agreement, which signed License Agreement shall be promptly fowarded to Polar.

D. Parties consider that the communication of the results of the tests previously carried out by Elf with the Product is a fair compensation for the granted option.

IV. MISCELLANEOUS

A. The validity and interpretation of this Agreement shall be governed by laws of the State of Michigan.

B. Force Majeure - No party shall be liable for failure of or delay in performing obligations set forth in this Agreement, and no party shall be deemed in breach of its obligations, if such failure or delay is due to natural disasters or any causes reasonably beyond the control of such party.

C. Assignment - This Agreement shall not be assignable by any party without the prior consent of the other.

D. Notices - Any notice, consent or approval required under this Agreement shall be in writing sent by registered mail, postage prepaid, or by telex or cable (confirmed by such registered mail) and addressed as follows.

If to Polar :

POLAR MOLECULAR CORPORATION
4901 Towne Centre Road
Vanguard Building
Suite 310
Saginaw, Michigan 48604
Attention : President

If to Elf :

ELF FRANCE
Centre de Recherche Elf Solaize
B.P. 22
F - 69360 Saint Symphorien d'Ozon
France
Attention : Gilbert CHAPELET

All notices shall be deemed to be effective on the date of mailing, in case any party changes, its address at which notice is to be received, written notice of such change shall be given without delay to the other party.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed as of the date first written above by their duly authorized officers.

POLAR MOLECULAR CORPORATION

By :
Mark L. Nelson

Title : President & C.E.O.

ELF FRANCE

By : Pacifique LE CLERE

Title : Marketing Manager
ELF FRANCE

EXHIBIT I

U.S. Patent #= 4753661

Date of Issue, June 28, 1988

20% Hexanol (Hexyl Alcohol)

30% Alox 400L

20% Xylene

15% Glyco-Ether DM (Diethylene Glycol Methyl Ether)

15% Mineral Seal Oil

EXHIBIT II

U.S. Patent #/= 4753661

Date of Issue, June 28, 1988

French Patent Application Pending #/= 8611194

Filed, August 1, 1986

Italian Patent #/= 1196571

Date of Issue, August 7, 1986

EXHIBIT III

License Agreement
OUTLINES

1. GRANT OF RIGHTS

- A license to make, have made, use and sell the Product in France in the Elf and Antar distribution network. Minimum annual quantity of product : 100,000 gl or if the product is rebalanced : 30,000 gl of Alox. The license Agreement shall start imediately at the end of the Option period.

- Non exclusive license. However POLAR shall not grant to a third party a similar license in France for 2 years (from the execution date of the License Agreement).

2. ROYALTIES

- Elf shall pay 2 U.S. $ per gallon of Product (manufactured). In the event that Elf, at its discretion, should modify the quantity of any of the ingredients in the Product for its use, the royalty payment shall be based upon the quantity of ALOX used, at $ 6.7 per gallon of ALOX.

- Payment in US $ on a base of quarter year periods within a 30 days time limit.

3. TERM

- Patent duration (Exhibit I).

4. IMPROVEMENT

- Each party will be the owner of its improvement relating the Product and shall inform the other party.

- If the other party is interested in obtaining a license to such improvements, the party will negociate in good faith the conditions of such license.

5. PATENTS

- POLAR shall maintain in force Patents Rights in France.

6. GUARANTEES

- In case of patent infringement action brought against ELF concerning the Product POLAR gives a guarantee limited to the total amount of the royalties due from the date of such action.

- In case of infringement of the Patent Rights by a third party, POLAR shall intervene or give ELF the legal means to bring suit aginst the infringer.

1 April 1992

ELF PMC DOW

CONFIDENTIAL

ELF RESEARCH CENTER

TESTING OF PMC GASOLINE ADDITIVES TECHNOLOGY
(1990-1991)

~~~~~

ELF-PMC-DOW 1 APRIL 1992

A SUMMARY OF ENGINE TESTS RESULTS

Ph. MULARD
~~~~~

1 April 1992

ELF DOW PMC

ENGINE TESTS PROCEDURES :

* *INTAKE VALVES DEPOSIT CONTROL*

* *OCTANE REQUIREMENT INCREASE CONTROL*

1 April 1992

ELF DOM PMC

INTAKE VALVES DEPOSIT TENDENCY :

- HONDA GENERATOR METHOD
According To SAE892121 :

**** Keep Clean***
**** 80 hrs***
**** Base Fuel = Unleaded Gas.***

- ON THE ROAD VEHICLES TESTING :

**** 5000 km (3125 miles) & 10000 km***
**** Keep Clean***
**** Base Fuel = Leaded & Unleaded Gas.***

- DB M102E BENCH TEST :

**** 60 hrs***
**** Keep Clean***
**** Base Fuel = Leaded Gas.***

1 April 1992

ELF DOW PMC

OCTANE REQUIREMENT INCREASE CONTROL :

- **ELF "IN HOUSE" BENCH TEST :**
  - **** Leaded Base Fuel = 100hrs***
  - **** Unleaded Base Fuel = 200hrs***
  - **** F3N Engine***
  - **** Engine OR measured at various rpm (typically from 2000 to 4100rpm)***
  - **** ORI expressed either in terms of Octane points / PRF or in terms of DKLSA***

- **RENAULT22700 BENCH TEST :**
  - **** Unleaded Base Fuel***
  - **** Additives Screening in 150hrs***
  - **** ORI expressed as DKLSA***

- **ON THE ROAD VEHICLES TESTING :**
  - **** 10000 km (6250 miles)***
  - **** Base Fuel = Leaded & Unleaded Gas.***
  - **** OR measured according to CORC procedure***

1 April 1992

ELF DOW PMC

PRELIMINARY REMARKS

ELF COMMITMENT TO ENGINE CLEANLINESS

REQUIRED PERFORMANCES of GASOLINE ADDITIVES PACKAGE :

* **Carburetter Detergency :**
Merit>8 - RENAULT5 Proc.

* **PFI Detergency :**
Flow Restriction<3% - PEUGEOT205GTI Proc.

* **Intake Valves Detergency:**
Intake Valves Deposits Reduction>80%
DB M102E 60hrs Proc.

* **ORI Control:**
Package should Demonstrate Ability to Reduce "ORI" Level by >=2 Octane Points/Base Fuel
RENAULT22700 Proc.

* **No Harm Effects(Sludge,Valve Sticking,...)**

* **Developed Package must Fulfil the Requirements of French Car Manufacturers & of DHYCA (State Reg.)**

1 April 1992

ELF DOW PMC

PRELIMINARY REMARKS(2)

~~~~~

INITIAL STUDIES WERE DEVOTED TO DEVELOP PACKAGE FOR BOTH LEADED AND UNLEADED MARKETS

↓

ACTUAL STRATEGIC MOVE IMPLIES DEVELOPMENT FOR UNLEADED MARKET ONLY
~~~~~

1 April 1992

ELF DOW PMC

OCTANE REQUIREMENT INCREASE CONTROL (3)

R21GTS(F2N) VEHICLE TESTS (10000KM)

(CORC PROCEDURE FOR OR MEASURES)

	MEAN ORI	
	BASE FUEL	**+500ppm vol DURALT FC**
LEADED GAS.	**4.6**	**0.8**
UNLEADED GAS.	**1.5**	**0.3**

**** DURALT FC EFFECT CONFIRMED IN UNLEADED GAS. & LEADED GAS.***

1 April 1992

ELF DOW PMC

GENERAL CONCLUSIONS :

**** DURALT FC proved Effective in Controlling ORI in Leaded & Unleaded Gas.***

No Effect Reported on Intake Valves Deposits.

**** Association with Detergent/Dispersant Add. must be carefully designed to Optimize Intake Valves Deposit Control.***

**** Best Candidate = GR364 Package***

(110 g/m3 MSC34-4-1 + EDP892)

with Satisfying IV Deposit Control & ORI Control in Leaded Gas.

BUT Significant ORI Control in Unleaded Gas. must be proved according to RENAULT22700 Proc.

TO: Mark L. Nelson, President & C.E.O.

FROM: Peter Slater

DATE: May 31, 1991

SUBJECT: Lubrizol papers

cc: File

POLAR MOLECULAR CORPORATION

Internal Correspondence

The enclosed papers, notes from Lubrizol concerning our viability, were received from Dick Valentine (Jiffy Lube) on May 3, 1991, as part of his response to why he doesn't want to work with us. I thought you would like to have a copy of this.

To. Rick Riley,

Hope this information is beneficial

Dot Schuler

I thought this information might be of interest to you.

Polar Molecular is in the opinion of "Stockbridge Partner, Inc.", a company about to go out of business.

It appears to be an organization with major financial difficulties.

In a recent discussion with Mike Marianacci, of Stockbridge, he is buying Polar's stock, short. He feels it is a stock fraud case. He also has spoken with Pfizer, Mercury Marine, Amway, and others, and assures everyone that at present, sales of Polar's products are <u>not</u> being made by these companies, even though they have agreements to do so.

Mike recommends to all concerned, buy short, and make money on the failure of Polar.

Regards,

RICK [illegible]

WORTHLESS DATA

"WANT LEGITIMATE DATA FROM LEGITIMATE CAS OR DON'T COME BACK" HAVEN'T BEEN BACK

WILL TAKE A LOOK CAN'T USE THEIR SAMPLE BECAUSE OF PATENT PROBLEMS.

HE WILL TEST SAMPLE WE SEND - NO PATENT PROBLEMS

SEND ALL LITERATURE

[illegible] MINIMUM VEHICLE

NOT IMPRESSED WITH CLIFF SHIELD'S

NO DETAIL UNLIMITED RELUCTANT TO DO TESTING WITHOUT MORE INFO FROM MFG DON'T WANT TO DO THEIR TESTING.

DATA TO BACK UP

[illegible] TO SUBMIT SAE PAPER

LOT OF CLAIMS — WON'T SUBMIT DATA

* SKEPTICAL [redacted]

NO TECH DATA

SENT UNSOLICITED — TALKED BY PHONE A PUEL ?? WOULD LOVE TO HAVE A SAMPLE BACK THIS UP - NO TAKERS

HAS SAMPLE ON HIS DESK — WON'T TEST — NO TIME FOR THINGS THAT MAKE CLAIMS

REVIEWED ALL INFO SUBMITTED — NO DATA

SAE PAPER — NEVER ACCEPTED BY SAE LACKING OR INSUFFICIENT DATA

[redacted] NO EC LEVEL SPECIFIC DATA — ALL SUBJECTIVE NO #'S

BEST THING GOING IS AGGRESSIVE SALES [illegible] & MARKETING.

WILL TEST IF SIGNIFICANT PRESSURE FROM [illegible]

Duralt -

No metals —

Except boron - 70 ppm ≡ 0.2 gm / gal

components —

25 % C6 alcohols

30 % Xylenes

9 % 2-(2-methoxy ethoxy) ethanol

8 % ethyl benzene

20 % Mixed Paraffins mostly C_{20}

NOT ANY BENEFIT

PROBABLY JUST A CARRIER + WAS AN IMPURITY ALONG WITH ETHYL BENZENE IN LOW GRADE XYLENE BOUGHT CHEAP

Octane

Base —	RON	90.6	MON	82.7
+ Duralt		90.0		82.5

Cetane

Base	41.0
+ Duralt	40.8

Mixed at 1 oz / 12 gal.

PER ON-BOTTLE

LUBRIZOL

INTER-OFFICE MEMORANDUM

To: R. C. Tupa

From: W. T. Wooring Date: February 16, 1989

Subject: POLAR MOLECULAR DURALT ADDITIVE - SAE PAPER NO. 890214

cc: TEJ, WEH/RMRo/EMR, DEK, CHB/JMS, JAG, CFPR/LPJ, PMF, RJWa, JWF, SADi KJF, RCT, MDLe, SHSt/ECM/BS, WTW, File

Polar Molecular Duralt Additive SAE Paper No. 890214

Following are some comments and questions about test results and interpretations of data in the subject paper. I hope they will be of some use as a basis for prepared discussion of the paper.

General

This paper is almost entirely enumeration of test data showing effects of the additive on ORI, emissions, fuel economy and valve seat recession. The additive is concluded to have benefits on all of these performance parameters. There is almost no attempt to explain why these effects occur. With all of these test results there should be some development of theories as to why and how the additive works. If the additive is actually effective in all these areas of performance, there must be more than one mechanism involved. A good technical paper should at least try to develop some of these mechanisms, otherwise the paper becomes simply an advertisement for the additive.

Octane Requirement Increase

The vehicle ORI test results (Table I) must be viewed with some suspicion. The tests were apparently run on used vehicles; they do not specify the odometer readings. Combustion chambers were cleaned at the start of each test. There is no indication about what was done with deposits on piston tops or valves. The unusual aspect of the test results is that equilibrium octane was obtained in 8 of 10 cars after accumulation of only 2,500 miles. Furthermore, octane requirements subsequent to the 2,500 mile tests were exact duplicates of the 2,500 mile results. It is well known that octane requirements with unleaded gasoline require extended mileage ($\sim$ 20,000) to stabilize. There is usually considerable variability in octane requirements among test periods during mileage accumulation.

Two tests (Figure 2) run in a 1.2L engine dyno test (one base fuel and one treated fuel) show lower ORI for the treated fuel. However, neither test was run to equilibrium octane. Octane requirements were still rising steadily for both fuels at the 200 hour test conclusion. It is entirely possible that equilibrium OR could be the same for both fuels, with the treated fuel perhaps requiring a longer time to reach equilibrium. Also, with only two tests, there is no way to estimate the effects of test repeatability on final results.

(continued)

Octane Number

The additive was reported to have no effect on research or motor octanes in primary reference fuels (Page 5). It did, however, improve octane performance in an L-4, 0.496L engine. The report further states that "User reports suggest that in-service increases in effective octane number are greater than this slight increase."

In the introductory material the paper states that the additive also improves cetane performance in diesel engines. Mechanisms for improving octane and cetane performance are exactly opposite in direction. Octane number is improved by minimizing precombustion reactions; cetane number is improved by encouraging early reactions to reduce ignition delay. There is no attempt in the paper to explain how one additive can affect both of these parameters favorably.

FTP Exhaust Emissions and Fuel Economy

FTP emissions and fuel economy effects (Table 4) were measured in two pairs of cars. Statistical significance is attached to the results by running paired t tests before and after mileage accumulation. I believe that the statistics were applied incorrectly. For example, triplicate FTP tests were run in two vehicles of the same make and model initially and after accumulation of 500 test miles. The statistical analysis assumes six independent determinations at each test period. Actually, there are only two independent tests run in triplicate. The additive effects on emissions and fuel economy are probably not as significant as the paper implies. I have asked Dan Meyer to comment on the validity of the analysis.

Dynamometer Emissions and Fuel Economy Tests

a) 1.6L Engine

Emissions and fuel economy were run at four air-fuel ratios during the ORI tests in this engine. Table 6 summarizes the results. Table D-2 shows more detail. Table D-2 shows treated fuel at 500 ppm additive; Table 6 shows treat level of 424 ppm. Effects on emissions and fuel economy vary with A/F. There is no attempt to explain why or to show how the additive can take advantage of this relationship.

(continued)

POLAR MOLECULAR CORPORATION

NOTES TO FINANCIAL STATEMENTS
FOR THE YEARS ENDED MARCH 31, 1989, 1988 AND 1987

1. BASIS OF PRESENTATION

Polar Molecular Corporation (the "Company") was incorporated (in Delaware) on January 12, 1984, merged with SunCom, Inc. (a Utah corporation) on January 29, 1986 in a reverse acquisition in order to facilitate the marketability of the Company's common stock. SunCom was incorporated on June 15, 1983 and performed no significant operations and did not have any material financial position as of the merger date. The Company was in the development stage through December 31, 1987. The fiscal year ended March 31, 1988 is the first year during which the Company is considered an operating company. The Company produces and markets various petrochemical lubricating compounds for use in crude and refined petroleum products.

The Company's financial statements have been prepared on a going concern basis. Such basis contemplates the realization of assets and the satisfaction of liabilities in the normal course of business. As shown in the financial statements, the Company has accumulated losses of $8,730,614. This, along with increased cash requirements, raise substantial doubt about the Company's ability to continue as a going concern. Although the Company's sales are anticipated to grow significantly in the coming year, the Company currently only has sufficient cash to sustain operations through August 1989. If, at the end of that time, the Company's sales are not able to support its operating expenditures, the Company will be forced to rely upon its ability to raise capital through a warrant exchange offer it is currently formulating in conjunction with Reich & Co., Inc., the Company's underwriter, and its ability to negotiate favorable extended terms from its vendors in order to continue unhindered operations. In the event that the Company's sales, private placements or other financing activities are insufficient or delayed and the Company is unable to meet its current operating obligations, the Company may, at its discretion, defer payment of officers' and consultants' salaries and fees until sufficient operating funds are available. The financial statements do not include any adjustments relating to the recoverability and classification of recorded asset amounts or the amount and classification of liabilities that might be necessary should the Company be unable to continue as a going concern. The Company's continuation as a going concern is dependent upon its ability to generate sufficient cash flows to meet its obligations on a timely basis, to obtain additional financing and, ultimately, to attain successful operations.

POLAR MOLECULAR CORPORATION

NOTES TO FINANCIAL STATEMENTS
FOR THE YEARS ENDED MARCH 31, 1989, 1988 AND 1987

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POLAR MOLECULAR CORPORATION

STATEMENTS OF LOSS
FOR THE YEARS ENDED MARCH 31, 1989, 1988 AND 1987

	NOTE	1989	1988	1987
Net sales	9	$ 999,747	$ 596,565	$ 328,717
COSTS AND EXPENSES:				
Cost of goods sold		361,354	232,571	104,535
Salaries		1,045,522	393,543	222,111
Professional fees		454,780	606,699	384,118
Research and development		662,344	372,875	209,049
General and administrative		1,400,277	351,589	454,027
Advertising and promotion		878,726	294,932	129,942
Travel		352,853	202,679	145,852
Depreciation and amortization		26,607	14,718	10,083
Total costs and expenses		5,182,463	2,469,606	1,659,717
OTHER INCOME		92,705	63,373	62,555
NET LOSS		$4,090,011	$1,809,668	$1,268,445
LOSS PER COMMON SHARE	15	$.19	$.11	$.08

See the notes to financial statements.

POLAR MOLECULAR CORPORATION

BALANCE SHEETS, MARCH 31, 1989 AND 1988

ASSETS	NOTES	1989	1988
CURRENT ASSETS:			
Cash		$ 653,772	$ 464,633
Accounts receivable, net of allowance for doubtful accounts of $46,662 for 1989 and $5,120 for 1988	9,10	42,058	56,840
Notes receivable	4		150,000
Inventories	5	216,221	131,623
Prepaid expenses		501,913	4,755
Total current assets		1,413,964	807,851
PROPERTY AND EQUIPMENT - NET	6	256,981	76,237
OTHER ASSETS			3,083
TOTAL		$1,670,945	$ 887,171
LIABILITIES AND STOCKHOLDERS' EQUITY			
CURRENT LIABILITIES:			
Accounts payable	7	$ 470,756	$ 295,204
Accrued expenses:			
Legal		51,011	136,312
Advertising		66,716	
Accounting		41,000	
Lawsuit settlement			37,500
Other	8	114,134	15,325
Other liabilities			11,188
Notes payable - current	7	3,851	
Total current liabilities		747,468	495,529
Accounts payable - long-term	7	114,789	
Notes payable - long term	7	8,149	
Total liabilities		870,406	495,529
COMMITMENTS AND CONTINGENCIES	11,12		
STOCKHOLDERS' EQUITY:			
Common stock of $.001 par value, authorized, 50,000,000; 23,233,707 and 17,914,864 shares issued and outstanding in 1989 and 1988, respectively	13,14	23,233	17,915
Paid-in capital		9,507,920	5,014,330
Deficit		(8,730,614)	(4,640,603)
Stockholders' equity		800,539	391,642
TOTAL		$1,670,945	$ 887,171

See the notes to financial statements.

INDEPENDENT AUDITORS' REPORT

To the Stockholders and Board of Directors of
Polar Molecular Corporation:

We have audited the accompanying balance sheets of Polar Molecular Corporation as of March 31, 1989 and 1988 and the related statements of loss, stockholders' equity and of cash flows for each of the three years in the period ended March 31, 1989. These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on these financial statements based on our audits.

We conducted our audits in accordance with generally accepted auditing standards. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

In our opinion, such financial statements present fairly, in all material respects, the financial position of Polar Molecular Corporation at March 31, 1989 and 1988 and the results of its operations and its cash flows for each of the three years in the period ended March 31, 1989 in conformity with generally accepted accounting principles.

The accompanying financial statements have been prepared assuming that the Company will continue as a going concern. As discussed in Note 1 to the financial statements, the Company's recurring losses raise substantial doubt about its ability to continue as a going concern. Management's plans concerning these matters are also described in Note 1. The financial statements do not include any adjustments that might result from the outcome of this uncertainty.

Deloitte Haskins & Sells

DELOITTE HASKINS & SELLS
Saginaw, Michigan
May 1, 1989

89 15 4491

RECD S.E.C.
JUL 3 1989
FEE 00

SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

FORM 10-K
ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d)
OF THE SECURITIES EXCHANGE ACT OF 1934

For the fiscal year ended March 31, 1989

Commission File Number 0-16095

POLAR MOLECULAR CORPORATION/UT
(Exact Name of Registrant as Specified in its Charter)

Utah
(State or other jurisdiction of incorporation or organization)

87-0415228
(I.R.S. Employer Identification Number)

4901 Towne Centre Road, Saginaw, Michigan
(Address of principal executive offices)

48604
(Zip Code)

Registrant's telephone number, including area code: (517) 790-4764

Securities registered pursuant to Section 12(b) of the Act:

None

Securities registered pursuant to Section 12(g) of the Act:

Common Stock, par value $.001

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports); and (2) has been subject to such filing requirements for the past 90 days.

YES X NO ____

As of May 31, 1989, 24,731,020 shares of the Registrant's Common Stock, par value $.001 per share, were outstanding. Based upon the bid price for the Company's common stock on that date as quoted on NASDAQ, the aggregate market value of the Registrant's common stock held by nonaffiliates on that date was $68,197,366.

DOCUMENTS INCORPORATED BY REFERENCE

None

May 1990 OTC Review

Letting the Sunshine In

While the SEC sleeps, stockbrokers have two sets of rules. Payment on time from you and me and special treatment for important short sellers like the Feshbach Brothers.

by Robert J. Flaherty

Unfair! The Stockbuster Feshbach Brothers can't have all the fun. How about me? No, I'm not going to impersonate the Chairman of the SEC. But, heigh ho, heigh ho, it's into the computer of Firm X, a major brokerage house, we go.

Gee it's dark in here. On to Firm X's statement of those secret short sellers, the Feshbachs. It is divided into four names: Feshbach Brothers, Silvertip Partners, Southgate Partners and Stockbuster Partners.

Many NASDAQ companies under bear raid attack shift their stocks to exchanges to escape the ferocious Feshbachs. Does it work? Not for the Big Board's Golden Valley Microwave Foods. Reading the accounts in this computer, it appears the Feshbachs did heavy short selling over the month before a highly negative Oct. 23, 1989, *Barron's* article on Golden Valley entitled "This Spud's for You?"

The attack sharply depressed Golden's stock from 36 to 25⅞ by questioning the success of the fast grower's diversification with french fries, as well as the integrity of management and its accounting. What foresight, what extrasensory perception behind such timely short selling.

Through Sept. 18, 1989, weekly trading volume tended to average 12,000 to 15,000 shares. Suddenly the number of Golden's shares traded weekly jumped to 39,000; 68,000; 80,000; 43,000; and 46,000 in the five weeks prior to that *Barron's* article. Recently weekly volume is back below 15,000 again.

Exchange-listed short targets are roughly 40% of the Feshbach portfolios with Firm X, versus 60% NASDAQ holdings. Students of bear raids will recognize such listed targets as AT&E, which is trying to develop the Dick Tracy wristwatch, Bank of New England, Carercom, Chase Medical, Colcco, Computer Associates, Crossland Savings, Fountain Powerboat, Home Owners Savings, Howtek, IGI, Jan Bell Marketing, MCORP, Price Communications and Windmere. All were on NASDAQ before the Stockbusters went after them.

Now to the Feshbach's current NASDAQ holdings. The Stockbusters are short lots of banks and developing biotechnology ventures like Cambridge Biosciences, Greenwich Pharmaceuticals, Imreg, Summa Medical, Viratek and Xoma. Technology plays include Babbages, Boston Technology, Cherne Medical, Codenoll, Copytele, Lifeline Health, Newbridge Networks and Occupational Urgent Care Health, the first company to file a RICO suit against short sellers.

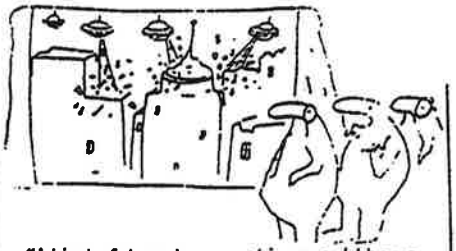
Other sizable holdings of the Feshbachs are such promising up-and-comers as Clean Harbors, Corrections Corporation of America, Digital Microwave, Egghead, First Executive, First World Cheese, Jiffy Lube, Pioneer Financial Services, Silk Greenhouse and WTD Industries. Also

NASDAQ Short Positions of Feshbach Brothers

Company Name	NASDAQ Symbol
Advanced Polymer Sys.	APOS
Advanced NMR Systems	ANMR
Advanta Corp.	ADVN
Affiliated Banc.	ABCV
Alpnet	AILP
Altus Bank	ALTS
Ameribank Investors Grp.	AINV
American City Bus. Jrnls.	AMBJ
American Medical Elec.	AMEI
Amerifirst Bank	AMRI
Amoskeag Bank	AMKG
Amvestors Financial	AVFC
Apogee Technology	APGG
Archer Commun.	QSNDF
Arizona Instruments	AZIC
Assix International	ASIX
Babbage's	BBGS
Bankworcester	BNKW
Barton Industries	BART
Baybanks	BBNK
Bell Savings	BSBX
Belmac	BEMCC
Bioject Medical	BJCTF
Boston Technologies	BSTN
Calumet Industries	CALIQ
Cambridge Biosciences	CBCX
Candela Laser	CLZR
Capitol Bancorp	CAPB
Carrington Laboratories	CARN
Centerbank (CT)	CTBX
Centex Telemanagement	CNTX
Central Banking	CSYSC
Cenvest	CBCT
Charter Federal	CHFD
Cherne Medical	CHNE
Chittenden	CNDN
Chronar	CRNR
Cirrus Logic	CRUS
Clean Harbors	CLHB
Clinical Technologies	CTAI
Codenoll Technologies	CODN
Colorocs	CLRX
Comptronix	CMPX
Copytele	COPY
Cordis	CORD
Corporate Data Sciences	CODS
Corrections Corp. of America	CCAX
Crestmont Fed. S&L	CRES
Delphi Information	DLPH
Digital Microwave	DMIC
Digital Products	DIPC
Digitech	DGTC
Dimensional Visions Grp.	DVGL
Doskocil Companies	DOSKQ
Dycom Industries	DYCO
Eastland Financial	EAFC
Egghead Software	EGGS
Excel Bancorp	XCEL
Executive Telecom	EXTL
Exploration Co. of LA	XCOL
First World Cheese	FWCH
Flight International Group	FLTIE
Franklin Electronic Pub.	FPUB
First American Bancorp	FAMB
First American Bank & Tr.	FIAMA
First Executive	FEXC
First Republic	FRBC
GSE Electronics	GSES
GV Medical	GVMI
Grayhound Electric	GRAY
Great American	GACC
Greenwhich Pharmaceutical	GRPI
Gruene	GRUNC

there is Dycom Indus. :s, which in last issue Feshbach Partn.:.' Tom Barton refused to admit he had shorted and whose name he had trouble spelling. RCM Technologies is also in the Feshbach Partners' portfolio, even though someone at their firm, according to a *Bowser Report* reader, said it wasn't. This is more evidence that a reverse 13-d type of filing for short sellers, with disclosure limits way below 5%, is needed for a level playing field, especially with the public being misled.

Now let's look in a new corner. I'm shocked, positively shocked. Here are thousands of shares of International Mobile Machines the Feshbachs bought, probably to cover an older short position, that they still hadn't paid for about 60 days later. This problem was corrected only after an outsider wrote to top management at Firm X. Ordinary people have to pay for securities they buy within five days or all hell breaks loose. The Feshbachs probably hadn't paid for those shares because this broker failed to deliver the shares they bought.



"I kind of thought something would be up when the Feshbachs began shorting real estate plays."

But what's this, Dr. Watson? Afterwards Firm X has let the Stockbusters short thousands and thousands of shares of IMM even though they haven't paid for the earlier pu.. ases, hence deluging the market with s.. :s to offset IMM's release of good news. From a recent low of 3⅜ IMM soared over 7 and then the Stockbusters busted it. Some securities traders call short selling timed this way "capping the market."

Because some Feshbach short selling is done through DVP (delivery versus payment) accounts, shares they sold at Firm X but that were supposed to be delivered from another place still haven't been delivered three weeks later. So the Stockbusters get away with shorting IMM without delivering shares and those shares don't show up in the short interest reported monthly to the public. Such secrecy!

One reason the Stockbusters can legally do overshorting is that the SEC still has failed to ban naked (not borrowing shares first) short selling by brokers like the Feshbachs who are not market makers. In 1988 the NASD passed this reform along to the SEC but no action has resulted. So now short selling equals at least 25% of IMM's public float and has been even higher. The Feshbachs have been allowed to short so much of IMM that the company must go bankrupt and be destroyed or the Stockbusters will face a short squeeze. Yet individuals are banned from naked short selling. Some level playing field.

Unlike the other large short selling accounts in Firm X's computer, the Feshbach brothers tend to go after small developing companies, often unprofitable and unsophisticated in defensive public relations. The bear attacks often starve the targets from obtaining capital and turn up-and-comers into down-and-outers.

In an interview granted to the Associated Press, Joseph Feshbach boasted the Stockbusters were right 90% of the time. So some caution that the proposed reverse 13-d disclosure rule might actually hurt companies further as others imitated the pros and shorted, too. In contrast, six witnesses at the Congressional hearings on abusive shorting (*OTC Review*, January) asked "Let the sunshine in."

Let's test to see if a ray of sunshine helps the Feshbachs and hurts the target companies' stocks or if more information makes other investors wiser. Here we list most of the NASDAQ short positions in a Feshbach account at Firm X. This isn't Cuba or China where truth must be hidden in shadows from our people. Why should secret short sellers have an edge over Mr. and Mrs. America? Let the sunshine in. □

NASDAQ Short Positions of Feshbach Brothers

Company Name	NASDAQ Symbol
HQ Office Supplies	HQOS
Hemodynamics	HMDY
Heritage Bancorp	HNIS
Houston Biomedics	HBII
Imreg	IMGA
Information Resources	IRIC
International Mobile Machines	IMMC
Investors Financial	INVF
Jesup Group	JGRPC
Jiffy Lube	JLUB
Kirschner Medical	KMDCD
Lifeline Health	—
Lone Star Technolgy	LSST
Magna International	MAGAF
Management Technologies	MTCI
Medstone International	MSHK
Metro Airlines	MAIR
Metropolitan Fed. S&L	MFTN
NESB	NESB
Nellcor	NELL
Newbridge Networks	NNCXF
Novacare	NVCR
Occupational Urgent Care Hlth.	OUCH
Octel Communications	OCTL
Old Stone	OSTN
Olympus Capital	OLCC
One Bancorp	TONE
Peoples Heritag	PHBK
Peripheral Syst	PSIX
Perpetual Finan	PFCP
Piedmont Fed .S..	PFSB
Pioneer Financial	PFSI
Pioneer Savings	PSBF
Polar Molecular	PMCX
Polifly Financial	PFLY
Poughkeepsie Sav.	PKPS
Profit Technology	PRTE
QMAX Technology	QMAXE
RCM Technology	RCMT
Radiation Disposal	RDIS
Regina Co.	REGIE
Research Industries	REIC
Riggs National	RIGS
Senior Service	SENR
Sentek PLC	SNTKY
ShareData	SHRD
Showscan Film	SHOW
Silicon Valley Bancshares	SIVB
Silk Greenhouse	SGHI
Software Service	SSOA
Somerset Bankshares	SOSA
Star States	STSS
Statewide Bancorp	STWB
Summa Medical	SUMA
S. Taylor Cos.	TAYSQ
Top Source	TOPS
Traditional Inds.	TRAD
Trion	TRON
United Guardian	UNIR
United Savers Bancorp	USBI
U.S. Energy	USEG
Unity Healthcare	UNTY
Valley National	VNCP
Veronex Resources	VEOXF
Video Jukebox	JUKE
Viratek	VIRA
Virginia Beach	VABF
WTD Industries	WTDI
Westwood One	WONE
Wolverine Exploration	WEXC
Xoma	XOMA
Xytronyx	XYYX
York Research	YORK