EPA-AA-TEB-511-81-17

EPA Evaluation of the Wickliff Polarizer Device Under Section 511 of the Motor Vehicle Information and Cost Savings Act

This document contains several pages which may not reproduce well. Any questions concerning the legibility of these pages should be directed to: Merrill W. Korth, Environmental Protection Agency, Office of Mobile Source Air Pollution Control, Emission Control Technology Division, 2565 Plymouth Road, Ann Arbor, MI 48105, (313) 668-4299 or FTS 374-8299

by

John C. Shelton

June, 1981

Test and Evaluation Branch
Emission Control Technology Division
Office of Mobile Source Air Pollution Control
U.S. Environmental Protection Agency

6560-26

ENVIRONMENTAL PROTECTION AGENCY

[40 CFR Part 610]

[FRL _____]

FUEL ECONOMY RETROFIT DEVICES

Announcement of Fuel Economy Retrofit Device Evaluation for "Wickliff Polarizer"

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice of Fuel Economy Retrofit Device Evaluation.

SUMMARY: This document announces the conclusions of the EPA evaluation of the "Wickliff Polarizer" device under provisions of Section 511 of the Motor Vehicle Information and Cost Savings Act.

BACKGROUND INFORMATION: Section 511(b)(1) and Section 511(c) of the Motor Vehicle Information and Cost Savings Act (15 U.S.C. 2011(b)) requires that:

(b)(1) "Upon application of any manufacturer of a retrofit device (or prototype thereof), upon the request of the Federal Trade Commission pursuant to subsection (a), or upon his own motion, the EPA Administrator shall evaluate, in accordance with rules prescribed under subsection (d), any retrofit device to determine whether the retrofit device increases fuel economy and to determine whether the representations (if any) made with respect to such retrofit devices are accurate."

(c) "The EPA Administrator shall publish in the Federal Register a summary of the results of all tests conducted under this section, together with the EPA Administrator's conclusions as to -

(1) the effect of any retrofit device on fuel economy;

(2) the effect of any such device on emissions of air pollutants; and

(3) any other information which the Administrator determines to be relevant in evaluating such device."

EPA published final regulations establishing procedures for conducting fuel economy retrofit device evaluations on March 23, 1979 [44 FR 17946].

ORIGIN OF REQUEST FOR EVALUATION: On March 10, 1981, the EPA received a request from Country Ford Sales, Inc. for evaluation of a fuel saving device termed "Wickliff Polarizer". This Device is claimed to reduce emissions and save fuel.

Availability of Evaluation Report: An evaluation has been made and the results are described completely in a report entitled: "EPA Evaluation of the Wickliff Polarizer Device Under Section 511 of the Motor Vehicle Information and Cost Savings Act," report number EPA-AA-TEB-511-81-17 consisting of 38 pages including all attachments.

Copies of this report may be obtained from the National Technical Information Service by using the above report number. Address requests to:

National Technical Information Service
U.S. Department of Commerce
Springfield, VA 22161
Phone: Federal Telecommunications System (FTS) 737-4650
Commercial 703-487-4650

Summary of Evaluation

EPA fully considered all of the information submitted by the Device manufacturer in his Application. No valid test data was submitted with the application.

Based on this information and EPA's experience with similar devices, there is no technical basis to support any claims for an improvement in fuel economy or reduction in exhaust emissions due to the "Wickliff Polarizer".

FOR FURTHER INFORMATION CONTACT: Merrill W. Korth, Emission Control Technology Division, Office of Mobile Source Air Pollution Control, Environmental Protection Agency, 2565 Plymouth Road, Ann Arbor, Michigan 48105, (313) 668-4299.

Date

Edward F. Tuerk
Acting Assistant Administrator
for Air, Noise, and Radiation

EPA Evaluation of the Wickliff Polarizer Device under Section 511 of the Motor Vehicle Information and Cost Savings Act

The following is a summary of the information on the device as supplied by the Applicant and the resulting EPA analysis and conclusions.

1. Marketing Identification of the Device:

Wickliff Polarizer G-100 for gasoline engines
G-200 for diesel and propane engines

2. Inventor of the Device and Patents:

A. Inventor

Edgar Wickliff
RR #4, Box 159
Shelbyville, IN 46176

B. Patent

Patent pending number 06-174691. Applicant stated "Our patent pending contains information that is a trade secret." "We feel it would be detrimental to our business organization to make a disclosure as you request in your application format, Section 3B."

3. Manufacturer of the Device:

Wickliff Polarizer, Inc.
1501 Miller Avenue
Shelbyville, IN 46176

4. Manufacturing Organization Principals:

Edgar Wickliff - President
Francis Jackson - Vice President
Ellen Wickliff - Secretary - Treasurer

5. Marketing Organization in U.S. making Application:

Country Ford Sales, Inc.
P.O. Box 850
Shelbyville, IN 46176

6. Applying Organization Principals:

Robert E. Wood - President
Dan Wood - Vice President
Mary Jo Wood - Treasurer
Rosemarie Beyer - Secretary

7. Description of Device:

A. Purpose of the Device (as supplied by Applicant):

Reduce emissions and save fuel.

B. Theory of Operation (as supplied by Applicant):

"Fuel and air are subjected to several fields of force prior to combustion. The net result is readily explainable thru a series of proven physical responses to known and accepted theory of internal combustion and observations."

C. Detailed Description of Construction (as supplied by Applicant):

See attached diagrams. The applicant stated "We feel it would be detrimental to our business organization to make a disclosure as you requested ..."

8. Applicability of the Device (as supplied by Applicant):

All gasoline and diesel powered vehicles.

9. Costs (as supplied by Applicant):

$199.95 for gasoline engines. (Attachment F)

10. Device Installation - Tools and Expertise Required (as supplied by Applicant):

"The air bars are installed inside the air cleaner so the air will pass over them before going into the carburetor. They are not to be installed directly over the carburetor. The fuel polarizer should be installed in the fuel line prior to any fuel pump and as close to the engine as possible. Be sure to install fuel polarizer so that fuel flows through polarizer in the proper direction."

"However, in V-8 engines, a carburetor adjustment is often required to develop the proper mixture required to avoid "pools of fuel" and obtain complete combustion."

11. Device Operation (as supplied by Applicant):

"See attached copy - 8B" (Attachment D).

12. Maintenance (claimed):

"Our device requires no maintenance."

13. Effects on Vehicle Emissions (non-regulated) (claimed):

"We've lowered the emissions on every installation."

14. Effects on Vehicle Safety (claimed):

"The only problem that might arise is if the fuel polarizer is not installed properly or secured properly it could cause leakage in gas line."

15. Test Results (Regulated Emissions and Fuel Economy) (submitted by Applicant):

The attached test results were performed on a 1977 Ford Thunderbird at steady state points of 60 mph, 50 mph, and idle (see Attachment B).

16. Testing by EPA:

The applicant failed to supply valid test data, therefore the device was not tested by EPA.

17. Analysis

A. Description of the Device:

The device is judged to be inadequately described. The applicant stated "We feel that it would be detrimental to our business organization to make a disclosure as you request in your application format." A brief description is contained under Section 10 Device installation of the application. (Attachment D).

B. Applicability of the Device:

The applicability of the device stated in the application covers all gasoline and diesel vehicles.

C. Costs:

Wickliff Polarizer is advertised at $199.95 (Attachment F).

D. Device Installation - Tools and Expertise Required:

The applicant did not specifically address the tools required or the expertise. It appears that mechanics tools and a skilled mechanic would be required for installation.

E. Device Operation:

The instructions were imcomplete and no mention was made of any operating instructions being required.

F. Device Maintenance:

The device requires no maintenance.

G. Effects on Vehicle Emissions (non-regulated):

The device is claimed to have lowered emissions on every installation, but no data to support these claims were ever submitted.

H. Effects on Vehicle Safety:

The only problem that might arise is if the fuel polarizer is not installed properly or secured properly it could cause leakage in the gas line.

I. Test Results Supplied by Applicant:

The applicant did not submit any test data in accordance with the Federal Test Procedure or the Highway Fuel Economy Test. The requirement for test data following these procedures is stated in the application test policy documents that EPA sends to potential applicants*. The only test data which were submitted were results from dynamometer tests at steady state conditions of 60 mph, 50 mph, and idle on one vehicle. These results were inconclusive. The test data submitted by the Applicant are attached (see Attachment B).

18. Conclusions

EPA fully considered all of the information submitted by the applicant in his application. Based on the available information and EPA's previous experience with similar devices, there is no technical basis to support any claims for an improvement in fuel economy or reduction in exhaust emissions due to the "Wickliff Polarizer."

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* From EPA 511 Application test policy documents:

Test Results (Regulated Emissions and Fuel Economy):
Provide all test information which is available on the effects of the device on vehicle emissions and fuel economy.

The Federal Test Procedure (40 CFR Part 86) is the only test which is recognized by the U.S. Environmental Protection Agency for the evaluation of vehicle emissions. The Federal Test Procedure and the Highway Fuel Economy Test (40 CFR Part 600) are the only tests which are normally recognized by the U.S. EPA for evaluating vehicle fuel economy. Data which have been collected in accordance with other standardized fuel economy measuring procedures (e.g. Society of Automotive Engineers) are acceptable as supplemental data to the Federal Test Procedure and Highway Fuel Economy Data will be used, if provided, in the preliminary evaluation of the device. Data are required from the test vehicle(s) in both baseline (all parameters set to manufacturer's specifications) and modified forms (with device installed).

List of Attachments

Attachment A	Letter, EPA to Mr. Bob Wood of Country Ford, August 21, 1980.
Attachment B	Letter, Mr. Wood to EPA, September 12, 1980.
Attachment C	Letter, EPA to Mr. Wood, January 2, 1981.
Attachemnt D	511 application from Mr. Wood to EPA, March 10, 1981.
Attachment E	Letter, EPA to Mr. Wood, March 18, 1981.
Attachment F	Sales brochure for Wickliff Polarizer.
Attachment G	Letter, EPA to Mr. Wood, June 29, 1981.

STEADY STATE MASS EMISSION TEST

TEST NUMBER: 0-1679
DATE: 05/12/80

VEHICLE: CF-2
TEST CELL 'C'

BASELINE

1

THIS TEST DATA WAS PROCESSED ON MON MAY 12, 1980 AT 15:09 HOURS

BAROMETER: 28.80 IN. HG
DRY BULB: 74 DEGREES F.
WET BULB: 65 DEGREES F.

RELATIVE HUMIDITY: 62.2 PERCENT
ABSOLUTE HUMIDITY: 81.05 GRAINS
NOX HUMIDITY CORRECTION: 1.029

--------- BACKGROUND CONCENTRATIONS --------

HC(PPM)	CO(PPM)	NOX(PPM)	CO2(%)
2.7	1	0.00	0.043

SPEED MPH	GEAR	---------- MASS EMISSIONS (GM/MI) ---------- HC	CO	NOX	CO2	MPG
60.0	D	1.06	9.30	9.11	441.1	19.33
50.0	D	0.75	6.03	5.91	369.4	23.28
0.0	N	3.26	28.44	0.02	55.6	80.22

MILES/GAL

Test #1

Before

STEADY STATE MASS EMISSION TEST

TEST NUMBER: 01679
DATE: 05/12/80

VEHICLE: CF2
TEST CELL 'C'

WITH POLARIZER

2

THIS TEST DATA WAS PROCESSED ON MON MAY 12, 1980 AT 16:08 HOURS

BAROMETER: 28.80 IN. HG
DRY BULB: 74 DEGREES F.
WET BULB: 65 DEGREES F.

RELATIVE HUMIDITY: 62.2 PERCENT
ABSOLUTE HUMIDITY: 81.05 GRAINS
NOX HUMIDITY CORRECTION: 1.029

BACKGROUND CONCENTRATIONS

HC(PPM)	CO(PPM)	NOX(PPM)	CO2(%)
7.1	1	0.98	0.045

SPEED MPH	GEAR	MASS EMISSIONS (GM/MI) HC	CO	NOX	CO2	MPG
60.0	D	0.71	5.81	8.68	443.0	19.53
50.0	D	0.65	4.76	5.70	371.3	23.30
0.0	N	3.20	28.81	0.03	56.6	79.23

43.

Test #2

AUTOMOTIVE TESTING LABORATORIES, INC.
19900 E. COLFAX, AURORA, COLO. 80011

CP

STEADY STATE MASS EMISSION TEST

TEST NUMBER: 0-1903
DATE: 05/30/80

VEHICLE: CF-2
TEST CELL 'C'

THIS TEST DATA WAS PROCESSED ON FRI MAY 30, 1980 AT 14:39 HOURS

BAROMETER: 28.92 IN. HG
DRY BULB: 74 DEGREES F.
WET BULB: 66 DEGREES F.

RELATIVE HUMIDITY: 66.1 PERCENT
ABSOLUTE HUMIDITY: 85.75 GRAINS
NOX HUMIDITY CORRECTION: 1.053

BACKGROUND CONCENTRATIONS			
HC(PPM)	CO(PPM)	NOX(PPM)	CO2(%)
3.7	0	1.96	0.048

SPEED		MASS EMISSIONS (GM/MI)				
MPH	GEAR	HC	CO	NOX	CO2	MPG
50.0	D	0.12	0.00	5.13	345.2	25.69
60.0	D	0.11	0.00	8.59	413.7	21.44

Test #3

AUTOMOTIVE TESTING LABORATORIES, INC.
19900 E. COLFAX, AURORA, COLO. 80011

STEADY STATE MASS EMISSION TEST

TEST NUMBER: 0-1994
DATE: 06/05/80

VEHICLE: CF-2
TEST CELL 'C'

THIS TEST DATA WAS PROCESSED ON THU JUN 05, 1980 AT 11:10 HOURS

BAROMETER: 29.13 IN. HG
DRY BULB: 77 DEGREES F.
WET BULB: 66 DEGREES F.

RELATIVE HUMIDITY: 56.3 PERCENT
ABSOLUTE HUMIDITY: 80.01 GRAINS
NOX HUMIDITY CORRECTION: 1.024

BACKGROUND CONCENTRATIONS

HC(PPM)	CO(PPM)	NOX(PPM)	CO2(%)
13.2	3	2.94	0.056

SPEED MPH	GEAR	MASS EMISSIONS (GM/MI) HC	CO	NOX	CO2	MPG
50.0	D	0.83	1.66	4.45	340.9	25.64
60.0	D	0.95	2.02	8.00	398.5	21.93

Test #4

AUTOMOTIVE TESTING LABORATORIES, INC.
19900 E. COLFAX, AURORA, COLO. 80011

August 21, 1980

Mr. Bob Wood
Country Ford
P.O. Box 850
Shelbyville, IN 46176

Dear Mr. Wood:

This is in response to your telephone request of August 19, 1980 with respect to the Federal Government's interest in "Polarizer", a device which you claim increases gasoline mileage and/or reduces exhaust emissions.

The Environmental Protection Agency is interested in all possible approaches to emissions control and improved fuel economy. We analyze all proposals to determine whether they show promise for meeting emissions standards or improving fuel economy. Because of the large number of proposals which we receive, we have to limit our testing to those devices which have shown significantly positive results when tested by a competent independent laboratory.

If you are interested in having your device evaluated by the Environmental Protection Agency, please follow the procedures detailed in the enclosed documents (EPA Retrofit and Emission Control Device Evaluation Test Policy; Federal Register, Part 610-"Fuel Economy Retrofit Devices" and Application Format for use with an evaluation of a Fuel Economy Retrofit Device).

On January 19, 1975, all Environmental Protection Agency responsibilities in the area of developmental funding of engines or devices was transferred to the Energy Research and Development Administration, now a part of the Department of Engergy. Presently, all inquiries pertaining to Federal funding should be directed to either of the following offices:

Mr. George Lewett
U. S. Department of Commerce
National Bureau of Standards
Office of Energy Related Inventions
Washington, DC 20234

Mr. George Thur
Office of Highway Systems
Div. of Transportation Energy Conservation
Department of Energy
Forestall Bldg., Mail Stop 5H063
Washington, DC 20585

It is hoped that this response adequately addresses your request.

Sincerely,

F. Peter Hutchins, Project Manager
Test and Evaluation Branch

Enclosures

ECTD:TEB:HUTCHINS:dkz:X259:2565PlymouthRd:5/27/80

Attachment B

FORD

COUNTRY FORD SALES, Inc.

U S Hwy 421 East P. O. Box 850
Telephone 392-3631 835-2272
SHELBYVILLE, INDIANA 46176

September 12, 1980

United States Environmental
Protection Agency
Ann Arbor, Michigan 48105

Subject: Wickliff Polarizer

Attn: F. Peter Hutchins, Project Mgr.
Test and Evaluation Branch

Dear Mr. Hutchins;

In reply to your letter of August 21, 1980 we have run extensive testing on the Wickliff Polarizer (patent pending) at the expense of Mr. Wickliff and myself.

I feel we have sufficient proof we can reduce emissions, eliminate odor from diesel engines, improve engine performance and improve gas mileage.

Enclosed you will find copies of four (4) tests that we have run at the Automotive Testing Lab Inc. at East Liberty, Ohio. All the testing listed below was on a 1977 Ford Thunderbird with approximately 43,000 miles and a 351 engine.

Test #1 was run with all the pollution devices of manufacture has installed

Test #2 was immediately after the installation of the Wickliff polarizer

Test #3 was run of the same vehicle after being driven 1200 miles

Test #4 was run on the same with catalytic convertors removed

I would like to bring to your attention the testing with the polarizer (Test #4) has less emissions and better fuel economy than Test #1 with the manufacture catalytic convertors on this vehicle.

Continued

Page 2

I have tested numerous diesel engines and every test we have eliminated the odor created by diesel fuel being burned in the engine.

I do not have equipment to check the emissions on a diesel engine in my service department, but I do know by reducing smell we are reducing emissions.

I, personally have watched eight hundred to one thousand Wickliff polarizers installed on gasoline and diesel engines and in every instance we have had an increase in RPM on idle, which means we are getting more horsepower out of fuel injected into the engine. Every installation has shown reductions in emissions measured by my own Sun Infra-Red Analyser Machine model EPA-75.

In response to your request to run additional evaluation test, I called Automotive Tesing Lab Inc. and received approximate cost of the tests you would require and their quote was estimated between $12,000.00 and $14,000.00 at our own expense. Since I believe we have already spent in excess of $17,000.00 for testing plus our time to run tests in my own service department, we feel this proves we have a product that would help control our emission problems for the public and the auto manufacturer as well and help to save energy.

At this time we are not in the position to spend the money that is required to run the tests you so require.

In light of the foregoing I would greatly appreciate the Enviromental Protection Agency proceed immediately to conduct its own test on the Wickliff polarizer. Any further delays will only keep this important product off the market place.

It is my belief the Enviromental Protection Agency has the responsibility to test this product with no further delays.

Please except this letter as formal request for the Enviromental Protection Agency to conduct its own testing of the Wickliff Polarizer.

Sincerely yours,

Robert E. Wood, President
Country Ford Sales, Inc.

cc: Birch Bayh
363 Russell Building
Washington, D. C.
20510

Enclosures

February 2, 1981

Mr. Bob Wood
Country Ford
P.O. Box 850
Shelbyville, IN 46176

Dear Mr. Wood:

Mr. John Chaille of the Indiana Department of Commerce Energy Section asked that I send you another copy of the documents to be used in applying for an EPA evaluation of the Wickliff Polarizer. These are the same documents that Peter Hutchins sent with his letter to you on August 21, 1980. You acknowledged receiving the letter from Mr. Hutchins in your return letter dated September 12, 1980.

Your letter of September 12, 1980, included some test data but did not include an application for an EPA evaluation. The test data was not acceptable to EPA because it was not run by the Fedeeal Test Procedure. Steady state points of 60 mph, 50 mph, and idle were used with no data collection under transient operation. I have discussed these problems with Mr. Dan Williams during our several telephone conservations.

The Environmental Protection Agency is charged by Congessional mandate to evaluate fuel economy and emission control devices. While the EPA does not actually "approve" such devices, it does conduct evaluations for the purpose of increasing the common knowledge in the area. For this reason, the outcome of any testing by EPA becomes public information. It is this information which may be cited although no claims can be made that any EPA findings constitute "approval" of the device or system.

Enclosed with this letter is a packet of materials which you will need to apply for an EPA evaluation of your device. This packet consists of 1) an application format, 2) a document entitled "EPA Retrofit and Emission Control Device Evaluation Test Policy" and 3) a copy of the applicable Federal Regulations.

In order for the EPA to conduct an evaluation of your device, we must have an application. Once you have reviewed all the documents in the packet, you should prepare an application in accordance with the guidelines of the application format. A critical part of the application is the substantiating test data. The required test results will have to be obtained at a laboratory

of your choice. Such testing would be conducted at your expense. A list of laboratories which are known to have the equipment and personnel to perform acceptable tests has been included in the enclosed packet. If you desire, we can assist in the development of a satisfactory test plan.

There are, however, several aspects concerning testing at an outside laboratory which I would like to bring to your attention at this time:

Minimum Test Requirements - Although different types of devices may require a more complex test plan, the minimum we require involves two vehicles and two test sequences run in duplicate. The vehicles should be selected from those listed in Table 1; if possible. Each vehicle is to be set to manufacturer's tune-up specifications for the baseline tests.

The tests are conducted in a "back-to-back" manner, once with the vehicle in baseline condition and again with the device installed with no vehicle adjustments between tests. If installation of the device also involves some adjustments, e.g. timing, fuel-air mixture, choke or idle speed, another test sequence with only these adjustments should be inserted between the first and last. Also as a minimum, the test sequence shall consist of a hot-start LA-4 portion (bags 1 and 2) of the Federal Test Procedure (FTP) and a Highway Fuel Economy Test (HFET). The details of these tests are contained in the enclosed packet. Although only a hot-start FTP is required to minimize the costs to you, you are encouraged to have the entire cold-start test performed since any testing and evaluation performed by EPA will be based on the complete FTP and you may wish to know how a vehicle with your device performs over this official test. As a final requirement, the personnel of the outside laboratory you select should perform every element of your test plan. This includes preparation of the test vehicle, adjustment of parameters and installation of the device.

Submission of Data - We require that all test data obtained from the outside laboratories in support of your application be submitted to us. This includes any results you have which were declared void or invalid by the laboratory. We also ask that you notify us of the laboratory you have chosen, when testing is scheduled to begin, what tests you have decided to conduct, allow us to maintain contact with the laboratory during the course of the testing, and allow the test laboratory to directly answer any questions at any time about the test program.

Cost of the Testing - The cost of the minimum test plan (two vehicles, two test sequences in duplicate) described above should be less than $2000 per vehicle and less than $4000 for the total test at any of the laboratories on the list. You will have to contact them individually to obtain their latest prices.

Outcome of the Tests - Although it is impossible to accurately predict the overall worth of a device from a small amount of testing, we have established some guidelines which will help you determine whether the test results with your device should be considered encouraging. These values have been chosen to assure both of us that a real difference in

fuel economy exists and that we are not seeing only the variability in the results. The table below presents the minimum number of cars that need to be tested for varying degrees of fuel economy improvement assuming a typical amount of variability in fuel economy measurement. For a minimum test plan which was conducted on a fleet of two cars, the average improvement should be at least 8%. If at least an 8% difference in average fuel economy can be shown, then we would be able to say statistically at the 80% confidence level that there is a real improvement.

Similarly, we would expect a minimum of 5% improvement for a fleet of 5 vehicles. Test results which display a significant increase in emission levels should be reason for concern.

Minimum Fuel Economy Improvements versus Size of Test Fleet

Fleet Size	Average Improvement Required
2	8%
3	7%
4	6%
5	5%
10	4%
25	2%

Once we receive your application, it will be reviewed to determine if it meets the requirements listed in the format. If your application is not complete, we will ask you to submit further information or data. After any missing information has been submitted, your application will be reconsidered and once it meets our requirements, you will be advised of our decision whether or not EPA will perform any confirmatory testing. Any EPA testing will be performed at no cost to you and you will be given the opportunity to concur with our test plan. Once this testing is complete, an evaluation report will be written. If no further testing is required, the report will be written solely on the basis of the test data submitted and our engineering analysis.

Despite the current backlog and increasing number of inquiries regarding fuel economy device evaluations, the EPA intends to process your application in as expeditious a manner as possible. We have established a goal of twelve weeks from the receipt of a complete application to the announcement of our report. The attainment of this objective requires very precise scheduling and we are depending on the applicant to respond promptly to any questions or to submit any requested data. Failure to respond in a timely manner will unduly delay the process. In the extreme case, we may consider lack of response as a withdrawal of the application.

I hope the information above and that contained in the enclosed documents will aid you in the preparation of an acceptable application for an EPA evaluation of your device. I will be your contact with EPA during this process and any subsequent EPA evaluation. My address is EPA, Motor Vehicle Emission Laboratory, 2565 Plymouth Road, Ann Arbor, Michigan, 48105. The telephone number is (313) 668-4200. Please contact me if you have any questions or require any further information.

Sincerely,

Merrill W. Korth
Senior Project Manager
Emission Control Technology Division

Enclosures

cc: P. Hutchins (letter only)
John Chaille (complete package)

Attachment D

FORD

COUNTRY FORD SALES, Inc.

U S Hwy 421 East P. O. Box 850
Telephone 392-3631 835-2272
SHELBYVILLE, INDIANA 46176

March 10, 1981

EPA
Motor Vehicle Emission Laboratory
2565 Plymouth Road
Ann Arbor, Michigan 48105

Subject: Application

Attn: Merrill Korth

1. Title Application of Evaluation of A Fuel Economy Retrofit Device Under Section 511 of the Motor Vehicle Information and Cost Savings Act and in addition an Application for Evaluation of an Emission Control Retrofit Device

2. Marketing Identification of the Device:

   Wickliff Polarizer G-100 for gasoline powered vehicles and D-200 for diesel and propane powered vehicles.

3. Identification of Inventory and/or Patent Protection:

   a. Edgar Wickliff R R #4 Box 159
   Shelbyville, Indiana 46176

   b. See attached letter

4. Identification of Device Manufacturers:

   Wickliff Polarizer Inc.
   1501 Miller Avenue
   Shelbyville, Indiana 46176

5. Identification of Manufacturing Organization's Principals:

   Edgar Wickliff - President
   Francis Jackson - Vice President
   Ellen Wickliff - Secretary-Treasurer

6. Identification of Organization Making Application:

   Country Ford Sales, Inc.
   P. O. Box 850
   Shelbyville, Indiana 46176

Cont'd

Page 2

7. Identification of Applying Organization's Principals:

   a. Robert E. Wood - President
      Dan Wood - Vice President
      Mary Jo Wood - Treasurer
      Rosemarie Beyer - Secretary

   b. Robert E. Wood or Dan Williams are our the company representatives to contact for any communications.

8. Description of Device

   a. Purpose of the Device: Reduce emissions and save fuel

   b. Theory of Operations: See attached letter

   c. Detailed Descriptions of Construction and Operation: See attached diagram

9. Applicability of the Device:

   All gasoline and diesel powered vehicles

   See attached drawings as you will see diesel unit is larger in size than gas

10. Device Installation:

    The air bars are installed inside the air cleaner so the air will passover them before going into the carburetor. They are not to be installed directly over the carburetor. The fuel polarizer should be installed in the fuel line prior to any fuel pump and as close to the engine as possible. Be sure to install fuel polarizer so that fuel flows through polarizer in the proper direction.

11. Device Operation:

    See attached copy - 8B

12. Device Maintenance:

    Our device requires no maintenance

13. Effects on Vehicle Emissions (non-regulated):

    We've lowered the emissions on every installation

14. Effects on Vehicle Safety

The only problem that might arise if if the fuel polarizer is not installed properly or secured properly it could cause leakage in gas line.

15. Test Results (regulated Emissions & Fuel Economy)

Waiting acknowledgment of receipt of application and further instructions regarding further test procedures per Merrill Korth.

Respectfully,

Robert E. Wood, President
Country Ford Sales, Inc.

REW:rb

cc U. S. Congressman Dave Evans
Phil Brown - Attorney, Wickliff Polarizer Inc.
James M. Robison - Attorney, Country Ford Sales, Inc.

FORD

COUNTRY FORD SALES, Inc.

U S Hwy 421 East P. O. Box 850
Telephone 392-3631 835-2272
SHELBYVILLE, INDIANA 46176

3-B-

March 10, 1981

EPA
Motor Vehicle Emission Laboratory
2565 Plymouth Road
Ann Arbor, Michigan 48105

Attn: Merrill Korth

Dear Merrill:

As per our conversation and in regards to our patent pending number 06-174691. We feel that it would be detrimental to our business organization to make a disclosure as you request in your application format, Section 3B. Our patent pending contains information that is a trade secret.

Please consider this as a formal request to procede with our application and for EPA to deal with Section 3B as you see fit.

Sincerely,

Dan

Dan Williams, Representative
Country Ford Sales, Inc.

DW:rb

8-B

THE WICKLIFF POLARIZER - An Analysis of Function:

Operation: Fuel and air are subjected to several fields of force prior to combustion.

Result: Increased efficiency of combustion resulting in an increase of horsepower and not only a reduction in visible exhaust trace but also reduced emissions of CO, HC, and NOX.

Theory: The net result is readily explainable thru a series of proven physical responses to known and accepted theory of internal combustion and observations.

1) Polarization of fluids: The acceptance of the idea that fuel and air could be polarized by exposure to an external force has its roots in the Theory of Ferro Magnetism. This was expounded upon in the translation of the Russian text of Vonsovsky * and Turov. This examination expounds on the Heisenberg exchange resulting in an internal field of aligned atoms.

The effect is the production of a permanent magnetic moment created by the movement of outer electrons moving into quantum states of higher principal quantum number. This state, effectively then, has broken down the fixed valence electrons that partake in the bonding process of the fuel compounds. These "active" states create the condition for freer association of fuel and air particles.

* JT. Exptl. Theor. Phys.(USSR) 1953, S.V. Vonsovsky and E.A. Turov

Consideration: While the basic theory of electromagnetic induced effects gave rise to the preceeding theory, we must interpret from the effect known as crystalline anistropy to explain how the "polarizer" is effectively "directionalized". This alignment does not necessarily create new hydrocarbon chains, but more explainably aligns the induced magnetic moment into a dipole relationship within itself: This "magnetic" alignment ** then permits rapid bonding with the respective oxidizing media.

** The Physical Principals of Magnetism, Morrish.

2) Lubricating qualities: The quantum change in particles that have been treated and the subsequent reduction of energy ***, creates a physical reduction in the density. The pressure induced by the polarization process as fluid passed through the interacting fields has been attributed to and is directly proportioned to the measurable change of density.

The phenomenon discribed was expounded upon in the Relativistic Principal of Virtual Power. In the section dealing with Polarization, Magnetism, Ohmic Loss, and Heat Flow, the author generalized on moving polarizable and magneticable media to discuss irreversible effects, such as heat loss and changes in viscosity.

*** Electrodynamics of Moving Media, Penfield & Haus, M.I.T. Press, 1967.

Observation: Once having been polarized, oil tends to become "lighter" and increase its lubricating qualities. The color of certain hydrocarbon fuels have been observed to take on a "golden hue". This can be readily attributed to the change of density and induced energy level, but no analysis has been completed to establish these causes, however, the results seem consistant to the known cause/effect relationships discussed previously.

3) Emission Control: The increased oxidation causes several effects. First, rapid and complete oxidation causes more rapid and total combustion of fuel. This physical occurance is measurable in the creation of a hotter flame. This increased temperature is of a shorter duration, i.e. burn time is reduced. This effect is the key to understanding the resulting measurable improvements in engine performance.

The faster burn and more efficient combustion will create a more concentrated force, driving pistons with more force, but for a shorter duration. This would typically lead to an observable effect of increased R.P.M.s upon "polarization".

Heat disemination is promoted in two ways: 1) the first due to the more increased expansion in gas as the piston is driven faster, and 2) elimination of "hot spots" as efficient and evenly distributed combustion diffuses heat over a broader area of cylinder wall and head.

The production of hydrocarbons and carbon monoxide are a product of incomplete combustion. These are theoretically minimized or eliminated by increasing oxidation and increasing temperature. In our model, we see both. Normal to an increase in temperature, however, is the increase in the formation of nitric oxide. This is referred to as the Zeldovich mechanism for nitrogen fixation. The presence of water vapor is also suspected to contribute to production of NOX due to the availability of hydroxyl radicals. $N^{\bullet} + OH \leftrightharpoons NO + H^{\bullet}$

However, the demonstrated effect of polarization is a net reduction in measurable NOX. Although it appears to be inconsistant, it is explainable. While there is a higher temperature produced, the length of time of burn is significantly reduced. Additionally, the heat is more rapidly diffused via increased gas expansion and conductance to a greater available surface area. Water vapor is reduced by the molecular activity during polarization. And finally, there is the elimination of "hot spots".****

**** Combustion Formation & Emission of Trace Species, Edwards, Ann Arbor Science, 1974

Observation: Elimination of Black Smoke in diesels under loaded conditions.

The net effect is that while there is a momentary increase in NOX production, the total emitted is less than that generated by a "longer burn". Production of NOX is directly proportionate to increase in temperature and the length or duration of time and inversely proportionate to expansion of gas and resultant cooling. "The longer the time that high temperatures are sustained in a combustion system, the longer the quantity of Nitric Oxide that can be expected to form". Pg. 52, Combustion Formation & Emission of Trace Species.

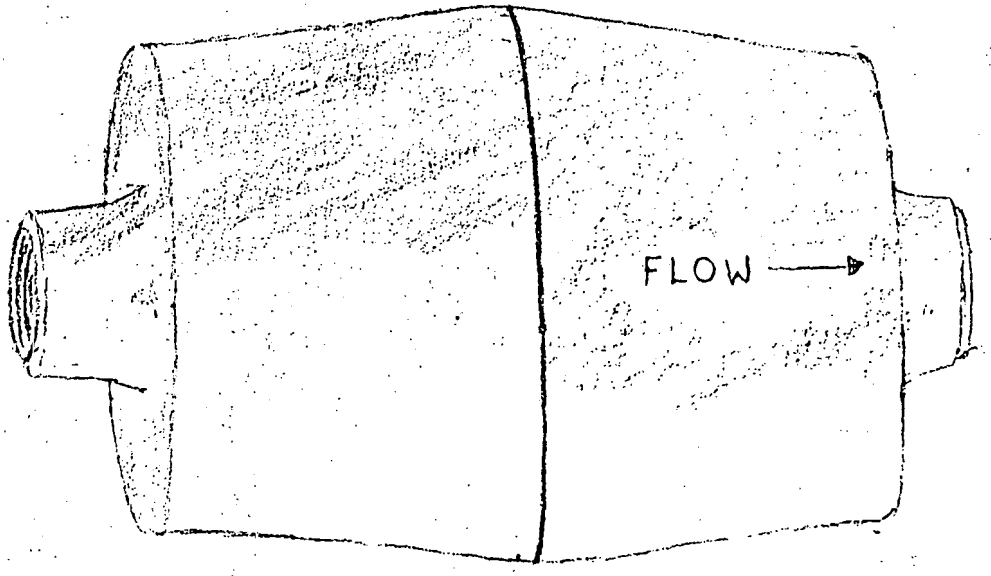
"Conversely, since nitric oxide formation continues well into the post flame region, rapid quenching of the post flame gases by heat removal or by gas expansion will tend to reduce nitric oxide formation in combustion systems". Ibid, Pg. 51.

Observation: Polarized engines will tend to reduce or eliminate HC and CO. Readings on a Sun analyser confirm this. Laboratory testing confirms a reduction in NOX. Most all engines will reflect an immediate increase in R.P.M.s. However, in V-8 engines, a carburator adjustment is often required to develop the proper mixture required to avoid "pools of fuel" and obtain complete combustion. Further, temperature of exhaust is reportedly reduced by 25° to 50°F range on diesel tractors and engine operating temperature readings on buses are reportedly reduced almost 20°F.

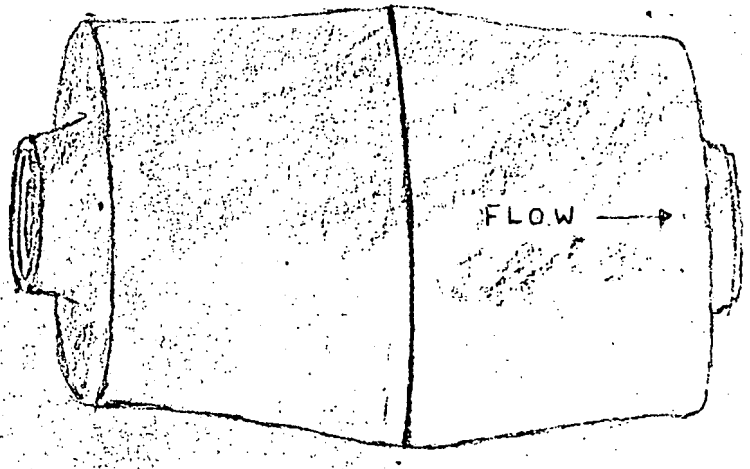
4) Improved Atomization: The polarization of fuel and air in a mixing chamber will provide compatible molecules. As described earlier, bonding has been broken down resulting in decreased density and hence, smaller particles and droplets. The decreased droplet size theory values the increase in surface per unit, increased evaporation rate, improved mixing of fuel and promotion of oxidation. Again, the net effect is the increased rate of combustion, increased power/unit/second and hence, reduced pollutants.

WICKLIFF POLARIZER

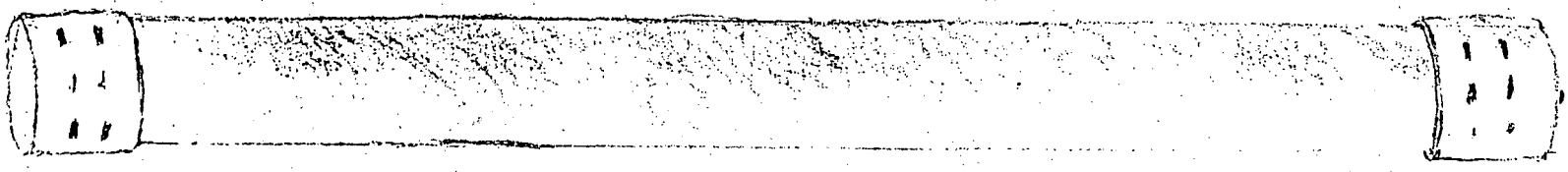
ACTUAL SIZE



DIESEL AND PROPANE ENGINES



GASOLINE ENGINES



AIR BAR

TWO REQUIRED FOR DIESEL

ONE REQUIRED FOR GASOLINE

Attachment E

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
ANN ARBOR, MICHIGAN 48105

OFFICE OF
AIR, NOISE AND RADIATION

March 18, 1981

Mr. Robert E. Wood
Country Ford Sales, Inc.
Shelbyville, IN 46176

Dear Mr. Wood:

We have reviewed your application for an evaluation of the "Wickliff Polarizer" using the information provided. Before your device can be fully evaluated by EPA, we require the following information:

1. A copy of the patent application and information regarding the contents of the unit so that we may determine if any harmful materials are present or if any toxic compounds are likely to result from its use. We also request more information on how the fuel is polarized as it passes through the unit. You have not submitted enough background data to allow us to understand the operating principle of the device.

2. Detailed instructions on the installation of the device complete with drawings and tools required for installation.

3. Data from exhaust emission tests on a minimum of two vehicles. Duplicate tests are required both before and after the device is installed. This is a total of at least eight hot-start tests. These tests must be performed at an independent laboratory recognized by EPA. I am enclosing an updated list of these laboratories. Please refer to the information I sent you on February 2, 1981 for details on the procedure to be used in gathering data at private laboratories. I am prepared to assist you further once you have made appropriate arrangements with a laboratory. We would like to comment on your test plan before testing begins.

4. A letter from the manufacturer of the Wickliff Polarizer indicating that your company is authorized to act on his behalf in applying for a 511 Evaluation.

In order to maintain our overall schedule for evaluating fuel economy retrofit devices, we need to know when we will receive the above information. Please contact me by April 10 with your estimate. The test results and other information should be submitted to us by May 15.

I hope this information and that contained in the enclosed documents will be helpful in the preparation of an acceptable application for an EPA evaluation of your device. Please contact me if you have any questions or require further information.

Sincerely,

Merrill W. Korth

Merrill W. Korth, Device Evaluation Coordinator
Test and Evaluation Branch

Enclosures

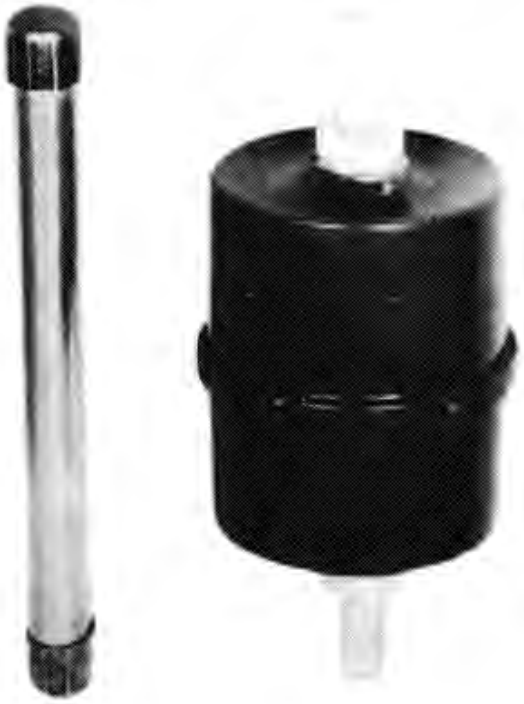
cc. J. Shelton
511 File "Wickliff Polarizer"

Attachment F

INTRODUCING

INTERNATIONAL FUEL SYSTEMS INC.

WICKLIFF POLARIZER



REDUCE POLLUTION

SAVE FUEL

SHELBYVILLE, INDIANA

THE ORIGIN OF THE WICKLIFF POLARIZER

Edgar Wickliff is an inventive, imaginative and far sighted individual. Twenty years ago he predicted that pollution and energy would sometime during the span of his life be of great concern to all people. He recognized then the coming of pollution-induced health hazards and fuel shortages which are so prevalent today.

With these potential problems clearly in mind, he devoted time and dedicated his efforts toward reducing pollution and conserving fuel, particularly on the fuel-powered engine. The dedication of his time, work experimentation, and analysis led to the development of the WICKLIFF POLARIZER.

Installation of the WICKLIFF POLARIZER on some fuel powered engines has produced the following benefits:

* More efficient fuel consumption.
* Reduction of friction leading to reduced engine wear and thereby prolonged engine life.
* Reduction or elimination of noxious pollutants from exhaust systems.

The benefits, when considered as a whole, invariably result in less fuel consumption and increased fuel mileage.

HYDROCARBON

HC

High hydrocarbons indicate wasted, unburned gasoline. Abnormal levels usually are caused by ignition or mechanical problems that cause misfiring.

CARBON MONOXIDE

CO

High carbon monoxide indicates inefficently burned gasoline, usually caused by over-rich fuel mixture, dirty air cleaner, plugged PCV systems, sticking choke or improper carburetor adjustments.

RESULTS OF INDEPENDENT LABORATORY
STEADY STATE MASS EMISSION TEST

Test Results Before and After
Installation of the WICKLIFF POLARIZER
On a 1977 Ford Thunderbird
Equipped with a 351 V-8 Engine, Automatic Transmission
With 43,000 Miles on Speedometer

	HC	CO	NOX	CO_2
BEFORE	1.06	9.30	9.11	441.1
AFTER	0.71	5.81	8.68	443.0

After Being Driven 2,000 Miles With the WICKLIFF POLARIZER,
Test Results Were as Follows:

	HC	CO	NOX	CO_2
AT 60 MPH	0.11	.000	8.59	413.7
AT 50 MPH	0.12	.000	5.13	345.2

CADILLAC IMPROVES MILEAGE

I installed a "WICKLIFF POLARIZER" on my 1979 Cadillac and increased my mileage from 10.2 to 16.1 mpg.

INCREASED MPG ON PICK-UP TRUCK

We tested the "WICKLIFF POLARIZER" on a 1980 Dodge D-200 pick-up truck and increased the mileage from 10.5 to 13.2 mpg.

REDUCED CARBON BUILD UP

I pulled my plugs before installing a POLARIZER and they had a huge build up of carbon. After using a "WICKLIFF POLARIZER" and driving 1400 miles, plugs were again pulled and showed no carbon build up whatsoever.

LTD 20% BETTER

After installation of a "WICKLIFF POLARIZER" on my LTD my mileage increased 20% per gallon.

MILEAGE AND PERFORMANCE

On my 1979 Pontiac Brougham I increased the mileage from 14.7 to 20.4 mpg and it is a different running auto.

ELIMINATED STALLING

My 1977 Mercury with 77,000 miles was giving me 16.3 miles per gallon and had a problem of stalling frequently. After installation of "WICKLIFF POLARIZER" my mileage increased to 19.6 mpg and it is now a pleasure to drive as it has stopped stalling.

STATE AGENCY TEST

A State Agency on test vehicles averaged 25.6% increase in gas mileage.

CHART YOUR OWN FUEL SAVINGS POTENTIAL

Driving 15,000 Miles Per Year
Average Cost Per Gallon of Fuel: $1.30

Compute Annual Savings Resulting From Various Percentage Improvements In Miles Per Gallon Based on Current Average Miles Per Gallon

MPG	10%		13%		16%		19%		22%		25%		30%		35%		40%	
Now	MPG*	$	MPG*	$	MPG*	$	MPG*	$	MPG*	$	MPG*	$	MPG*	$	MPG*	$	MPG*	$
20	2.0	98	2.6	127	3.2	156	3.8	185	4.4	215	5.0	244	6.0	293	7.0	341	8.0	390
19	1.9	103	2.47	133	3.04	164	3.61	195	4.18	226	4.75	257	5.7	308	6.65	359	7.6	410
18	1.8	108	2.34	141	2.88	173	3.42	206	3.96	238	4.5	271	5.4	325	6.3	379	7.2	433
17	1.7	114	2.21	149	2.72	184	3.23	218	3.74	252	4.25	287	5.1	355	5.95	401	6.8	459
16	1.6	122	2.08	158	2.56	195	3.04	232	3.52	268	4.0	305	4.8	366	5.60	427	6.4	488
15	1.5	130	1.95	169	2.40	208	2.85	247	3.3	286	3.75	325	4.5	390	5.25	455	6.0	520
14	1.4	139	1.82	181	2.24	223	2.66	265	3.08	306	3.50	348	4.2	418	4.90	488	5.6	557
13	1.3	150	1.69	195	2.08	240	2.47	285	2.86	330	3.25	375	3.9	450	4.55	525	5.2	600
12	1.2	165	1.56	215	1.92	264	2.28	314	2.64	363	3.0	413	3.6	495	4.2	577	4.8	660
11	1.1	173	1.43	230	1.76	284	2.09	337	2.42	390	2.75	443	3.3	532	3.85	621	4.4	70[illegible]
10	1.0	195	1.3	254	1.6	312	1.9	371	2.2	429	2.5	488	3.0	585	3.5	683	4.0	780

MPG* = Miles Per Gallon Increase

$ = Annual Fuel Dollars Saved At Each Level of Mileage Improvement

WICKLIFF POLARIZER

Marketed By

INTERNATIONAL FUEL SYSTEMS, INC.
2770 East State Road 44
Shelbyville, Indiana 46176
Phone (317) 398-9716

Dealer:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
ANN ARBOR, MICHIGAN 48105

OFFICE OF
AIR, NOISE AND RADIATION

June 29, 1981

Mr. Robert E. Wood
Country Ford Sales, Inc.
P.O. Box 850
Shelbyville, IN 46176

Dear Mr. Wood:

In my letter to you of March 18, 1981, I explained the requirement for testing of "Wickliff Polarizer" by an independent laboratory recognized by EPA. I also presented several other questions to you at that time. I asked that you respond to my letter by May 15, 1981. We have not received your response. Since you have not supplied EPA with appropriate test data for the "Wickliff Polarizer", we have insufficient data to support your claim for its emission reduction or fuel economy benefits.

Under the provisions of Section 511 of the Motor Vehicle Information and Cost Savings Act, EPA is required to evaluate your device on the basis of available information and publish the results of our evaluation in the Federal Register . We have begun to prepare our report.

Please contact me immediately if you do not understand this course of action. My telephone number is (313) 668-4299.

Sincerely,

Merrill W. Korth

Merrill W. Korth, Device Evaluation Coordinator
Test and Evaluation Branch

cc. 511 file (Wickliff Polarizer)
J. Shelton

SUNDAY, JULY 27, 1980 — THE INDIANAPOLIS STAR

WICKLIFF POLARIZER™

- ★ Reduces Exhaust Emissions!
- ★ Improves Fuel Economy!
- ★ Improves Engine Performance!
- ★ Increases Spark Plug Life!
- ★ Eliminates Exhaust Odors In Gas and Diesel Engines!
- ★ Does All This By Creating a More Complete Burn Of Fuel In Engine!

INTRODUCTORY OFFER $199.95

DIESEL SLIGHTLY HIGHER

★ INDEPENDENT LAB. TEST RESULTS:

	HYDRO CARBONS	CARBON MONOXIDE	NITRIC OXIDE	
BEFORE POLARIZATION	HC-p/75	CO-6.03	NOx-5.91	MPG 23.28
AFTER POLARIZATION	HC-0.12	CO-0.00	NOx-5.13	MPG 25.69

★ TEST WAS PERFORMED FOR BOB WOOD COUNTRY FORD ON A T-BIRD WITH 43,000 MILES AT 50 MPH. OUTPUT OF EMISSIONS SHOWN IN GRAMS PER MILE.

Available At These Fine Dealers:

Country Ford Sales	Shelbyville	317-835-2272
Eastgate Chrysler Ply.	Indianapolis	317-352-9361
Dick Krieg Motors	Lafayette	317-474-1434
Dave McIntire Chev.	Indianapolis	317-297-4040
Owen Reed Chev.	Franklin	317-736-5141
Schoettmer Ford Sales	Edinburgh	812-888-2963
Scripture Bros. Chrysler -Plymouth	Greensburg	812-663-6101
Scripture Chrysler-Plymouth	Shelbyville	317-398-9716
Danny Scripture Chev.	Connersville	317-825-3102
Jack Shields Ford	New Castle	317-462-5580
Jack Smart Ford	Greenwood	317-881-2541
Jim Southworth Inc.	Marion	317-662-2561
Heckaman Buick	Anderson	317-649-1253
McCarroll Chevrolet-Olds	Elwood	317-552-9811
Foxworthy Ford	Indianapolis	317-846-4241