

State of California
AIR RESOURCES BOARD

EXECUTIVE ORDER D-35
Relating to Exemptions under Section 27156
of the Vehicle Code

HYDRO-CATALYST CORPORATION
"PRECOMBUSTION CATALYST-CALIFORNIA DESIGN"

Pursuant to the authority vested in the Air Resources Board by Section 27156 of the Vehicle Code; and

Pursuant to the authority vested in the undersigned by Section 39023 of the Health and Safety Code;

WHEREAS: It has been found that the "Precombustion Catalyst-California Design" device has no statistically significant effects on exhaust emissions;

IT IS ORDERED AND RESOLVED: That the installation of the "Precombustion Catalyst-California Design" device manufactured by the Hydro-Catalyst Corporation has been found to not reduce the effectiveness of required motor vehicle pollution control devices and, therefore, is exempt from the prohibitions of Section 27156 of the Vehicle Code for 1974 and older model-year vehicles.

The device consists of two formed screens made of fine mesh wire cloth mounted under each carburetor barrel. The upstream screen is plated with cadmium and the downstream screen with nickel.

This Executive Order is valid provided that installation instructions for this device will not recommend tuning the vehicle to specifications different than those listed by the vehicle manufacturer.

Changes made to the design or operating conditions of the device as submitted to the Air Resources Board for evaluation that adversely affect the performance of the vehicle's pollution control devices shall invalidate this Executive Order.

Marketing of this device using an identification other than that shown in this Executive Order or marketing of this device for an application other than those listed in this Executive Order shall be prohibited unless prior approval is obtained from the Air Resources Board.

This Executive Order does not constitute any opinion as to the effect that the use of this device may have on any warranty either expressed or implied by the vehicle manufacturer.

THIS EXECUTIVE ORDER DOES NOT CONSTITUTE A CERTIFICATION, ACCREDITATION, APPROVAL, OR ANY OTHER TYPE OF ENDORSEMENT BY THE AIR RESOURCES BOARD OF ANY CLAIMS OF THE APPLICANT CONCERNING ANTI-POLLUTION BENEFITS OR ANY ALLEGED BENEFITS OF THE "PRECOMBUSTION CATALYST-CALIFORNIA DESIGN" DEVICE.

No claim of any kind, such as "Approved by Air Resources Board" may be made with respect to the action taken herein in any advertising or other oral or written communication.

Section 17500 of the Business and Professions Code makes unlawful, untrue or misleading advertising, and Section 17534 makes violation punishable as a misdemeanor.

Sections 39130 and 39184 of the Health and Safety Code provide as follows:

"39130. No person shall install, sell, offer for sale, or advertise, or, except in an application to the board for certification of a device, represent, any device as a motor vehicle pollution control device unless that device has been certified by the board. No person shall sell, offer for sale, advertise, or represent any motor vehicle pollution control device as a certified device which, in fact, is not a certified device. Any violation of this section is a misdemeanor."

"39184. (a) No person shall install, sell, offer for sale, or advertise, or, except in an application to the board for accreditation of a device, represent, any device as a motor vehicle pollution control device for use on any used motor vehicle unless that device has been accredited by the board. No person shall sell, offer for sale, advertise, or represent any motor vehicle pollution control device as an accredited device which, in fact, is not an accredited device. Any violation of this subdivision is a misdemeanor."

On the basis of its evaluation of the "Precombustion Catalyst-California Design" device, the Air Resources Board has determined that the "Precombustion Catalyst-California Design" device does not have a beneficial effect on gasoline mileage or exhaust emissions.

Any apparent violation of the conditions of this Executive Order will be submitted to the Attorney General of California for such action as he deems advisable.

Executed at Sacramento, California, this 1 day of ^{August}~~July~~, 1974.

WILLIAM SIMMONS
Executive Officer

State of California

AIR RESOURCES BOARD

July 23, 1974

Staff Report

Evaluation of Hydro-Catalyst Corporation
"Precombustion Catalyst-California
Design" Device for Compliance with
the Requirements of Section 27156 of
the Vehicle Code

I. Introduction

On January 4, 1974, Hydro-Catalyst Corporation requested an exemption from the prohibitions of Vehicle Code Section 27156 for its "Precombustion" catalytic device. The staff reported its evaluation of the device to the Executive Officer on June 11, 1974 with the recommendation to deny Hydro-Catalyst Corporation's request for an exemption from the requirements of Section 27156. The recommendation was based on significant increases in hydrocarbon and oxides of nitrogen produced by the device measured during emission testing at the Air Resources Board Laboratory. On June 18, 1974, the Executive Officer notified the Hydro-Catalyst Corporation of his denial of its application. On July 9, 1974, the Hydro-Catalyst Corporation submitted an application for a re-evaluation of a modified device relative to the requirements of Section 27156. This device has been identified as the "Precombustion Catalyst-California Design" device.

II. Device Description

The modified device incorporates a screen array of the same design as the device that was initially submitted for evaluation. It consists of a pair of formed fine mesh wire cloth installed below (downstream) each

carburetor barrel. The screens are held in place by typical mounting gaskets. Devices are available for 1-, 2- and 4-barrel carburetor installations. For a more detailed description of the screen design and device function, see Appendix I, the staff report entitled "Evaluation of Hydro-Catalyst Corporation 'Pre-Combustion' Catalytic Device for Compliance with the Requirements of Section 27156 of the Vehicle Code", dated June 11, 1974.

The modified device does not employ initial Hydro-Catalyst device modifications to the OEM engine settings whereas the initial Hydro-Catalyst device did. In addition, the California Design device incorporated changes to the gasket for six-cylinder Chrysler Product applications to conform with OEM one-barrel carburetors.

III. Device Evaluation

A. Applicant's Test Data

The applicant submitted emission test data performed by Scott Laboratories on a 1972 Oldsmobile, 455 CID, 4-barrel carburetor and automatic transmission. These data were extracted from test results of a series of tests performed on this vehicle to determine the emission effects of the screen device in combination with various changes in OEM engine settings.

The submitted data are intended to show the effects of the screen device without any changes to OEM engines settings as compared to the baseline vehicle. Several factors preclude the possibility of directly comparing

the two sets of data. First, the device test was performed approximately one month and 3,000 vehicle miles after the baseline tests. Second, the baseline test was performed according to the cold-start CVS test procedure and the device test was performed according to the hot-start CVS test procedure. Therefore, no conclusion can be made from these data. The submitted data are shown in Appendix II. The following is a summary of these data:

<u>Vehicle</u>	<u>Device Installed</u>	<u>Type of Test</u>	<u>Exhaust Emissions</u>		
			<u>Grams/Mile</u>		<u>NOx</u>
			<u>HC</u>	<u>CO</u>	
1972 Oldsmobile	No	Cold CVS	1.39	17.59	6.67
	Yes	Hot CVS	1.24	13.57	4.70

B. Air Resources Board Test Data

Emission tests were performed at the Air Resources Laboratory on the following vehicles equipped with automatic transmissions:

1972 Dodge Pick-up, 225 CID engine with 1-barrel carburetor.

1972 Dodge Pick-up, 318 CID engine with 2-barrel carburetor.

1974 Chevrolet Pick-up, 350 CID engine with 4-barrel carburetor.

A series of three baseline and three device hot-start CVS tests were performed on each vehicle. The tests were designed to statistically nest and balance the data obtained from the tests of the three vehicles. The vehicles were each adjusted to the vehicle manufacturer's engine settings for all tests. The following are the results of the emission tests:

Vehicle	Device Installed	HC	Hot-Start CVS Avg. Grams/Mile			Fuel Economy MPG
			CO	NOx	CO2	
1972 Dodge 225-1V	No	2.09	45.14	3.30	541.9	14.3
	Yes	2.28	42.31	3.48	535.5	14.6
Percent Change		(9.1)	(-6.3)	(5.4)	(-1.0)	(2.0)
1972 Dodge 318-2V	No	1.74	16.85	3.26	614.3	13.7
	Yes	1.86	15.69	3.16	623.1	13.5
Percent Change		(6.9)	(-6.9)	(-3.1)	(1.4)	(-1.5)
1974 Chevrolet 350-4V	No	1.90	9.39	1.71	744.9	11.6
	Yes	1.94	9.83	1.69	728.3	11.8
Percent Change		(2.1)	(4.7)	(-1.2)	(-2.2)	(1.7)
Fleet Avg. Percent Change		(6.1)	(-5.0)	(0.7)	(-0.8)	(0.8)

An analysis of variance statistical test with nested classification was used to evaluate these data. See Tables 1 through 4 for the statistical summaries. The analysis of variance shows no statistical difference between the emissions obtained with and without the device at the 95% confidence level. Also, no significant difference was found in fuel economy at the 95% confidence level with and without the device. Although a 9.1% increase in HC and 5.4% increase in NOx was noted with the one-barrel carburetor, this effect was believed to be adversely influenced by intermittent operation of the vacuum spark advance temperature control unit on the vehicle.

C. Durability Evaluation

The 1-, 2- and 4-barrel carburetor devices were examined after the hot-start CVS test series. The wire cloths of all of the devices were relatively clean and undamaged. The 1-barrel carburetor device after testing is shown in Figure 1.

After completing the hot-start CVS test series, the vehicle with the 4-barrel device accumulated approximately 2,000 miles of service. The wire cloth is coated with a residue probably composed of the dyes and additives found in the gasoline. The residue pattern appears to be oriented according to the fuel passages. See Figure 1. The residue thickness would be expected to reach an equilibrium value which would not restrict air flow sufficiently to cause an adverse effect on emissions due to the gasoline's solvent action. No other long term problems would be anticipated based on engineering judgment.

D. Installation Instructions

The Staff has verified that the submitted device installation instructions reflect the proper OEM or exhaust retrofit device manufacturer's settings for idle speed and mixture ratio. The installation instructions do not contain any statements relative to ignition timing settings. Other items which the Staff required in the installation instructions were: (1) more specific instructions relating to any required choke adjustments; (2) the specified torque values corrected to show proper units (foot-pounds or inch-pounds); (3) clarify when the original carburetor mounting gaskets may be used or replaced; and (4) replace the carburetor mounting studs with longer ones when necessary rather than backing out the original studs from their mounting holes for adequate length.

The applicant has satisfied all these installation instruction requirements.

IV. Conclusions and Recommendations

It is the Staff opinion that Hydro-Catalyst Corporations "Precombustion Catalyst-California Design" device has neither a statistically significant effect on exhaust emissions nor fuel economy.

It is recommended that Hydro-Catalyst Corporation be granted an exemption from the prohibitions of Vehicle Code Section 27156 for its "Precombustion Catalyst-California Design" device for use on 1974 and older model-year vehicles.

TABLE 1

Hydrocarbons

Hot-Start CVS-1 Exhaust Emission Tests

Device: Hydro-Catalyst
 Vehicle #1: 1972 Dodge 318 CID, V-8, 2-barrel
 Vehicle #2: 1974 Chev. P.U. 350 CID, V-8, 4-barrel
 Vehicle #3: 1972 Chev. P.U. 225 CID, 6-Cyl., 1-barrel

<u>Status Test</u>	<u>Vehicle #1</u>		<u>Vehicle #2</u>		<u>Vehicle #3</u>	
	<u>Baseline</u>	<u>w/Device</u>	<u>Baseline</u>	<u>w/Device</u>	<u>Baseline</u>	<u>w/Device</u>
1	1.88312	1.66092	1.96654	1.97853	2.22454	2.11763
2	1.71762	2.01534	1.86974	1.89728	2.05281	2.34564
3	1.63249	1.91268	1.85081	1.94325	2.00821	2.36244
	\bar{X} (baseline) = 1.91176			\bar{X} (w/device) = 2.02597		

Analysis of Variance

<u>Source of Estimate</u>	<u>Sum of Squares</u>	<u>D.F.</u>	<u>Mean Squares</u>	<u>Computed F-Value</u>
Between Vehicles	0.46023	2	0.23012	15.91425
Between Devices within Vehicles	0.07262	3	0.02421	1.67402
Between Tests within Vehicles and Device	0.17352	12	0.01446	

Critical F (3,12) = 3.4903 (95% confidence level)

Not significant upon 95% confidence level.

TABLE 2

Carbon Monoxide

Hot-Start CVS-1 Exhaust Emission Tests

Device: Hydro-Catalyst
 Vehicle #1: 1972 Dodge 318 CID, V-8, 2-barrel
 Vehicle #2: 1974 Chev. P.U. 350 CID, V-8, 4-barrel
 Vehicle #3: 1972 Chev. P.U. 225 CID, 6-cyl., 1-barrel

<u>Status Tests</u>	<u>Vehicle #1</u>		<u>Vehicle #2</u>		<u>Vehicle #3</u>	
	<u>Baseline</u>	<u>w/Device</u>	<u>Baseline</u>	<u>w/Device</u>	<u>Baseline</u>	<u>w/Device</u>
1	17.48377	16.84050	9.13490	10.02090	48.12819	42.88754
2	17.09191	15.10659	9.77309	8.76980	45.82496	42.61895
3	15.96081	15.12254	9.26830	10.72427	41.45636	41.41458
	\bar{X} (baseline) = 23.79137			\bar{X} (w/device) = 22.61174		

Analysis of Variance

<u>Source of Estimate</u>	<u>Sum of Squares</u>	<u>D.F.</u>	<u>Mean Squares</u>	<u>Computed F-Value</u>
Between Vehicles	3922.47750	2	1961.23875	794.51190
Between Device within Vehicles	14.31080	3	4.77027	1.93247
Between Tests within Vehicles and Device	29.62179	12	2.46828	

Critical F (3,12) = 3.4903 (95% confidence level)

No significant difference upon 95% confidence level.

TABLE 3

Oxides of Nitrogen

Hot-Start CVS-1 Exhaust Emission Tests

Device: Hydro-Catalyst
 Vehicle #1: 1972 Dodge 318 CID, V-8, 2-barrel
 Vehicle #2: 1974 Chev. P.U. 350 CID, V-8, 4-barrel
 Vehicle #3: 1972 Chev. P.U. 225 CID, 6-cyl, 1-barrel

<u>Status</u> <u>Test</u>	<u>Vehicle #1</u>		<u>Vehicle #2</u>		<u>Vehicle #3</u>	
	<u>Baseline</u>	<u>w/Device</u>	<u>Baseline</u>	<u>w/Device</u>	<u>Baseline</u>	<u>w/Device</u>
1	3.28011	3.05696	1.67738	1.72541	3.92070	2.94271
2	3.28557	3.27417	1.76230	1.60365	3.03460	3.77239
3	3.20463	3.16331	1.69848	1.74240	2.95532	3.72594
	\bar{X} (baseline) = 2.75768			\bar{X} (w/device) = 2.77855		

Analysis of Variance

<u>Source of Estimate</u>	<u>Sum of Squares</u>	<u>D.F.</u>	<u>Mean Squares</u>	<u>Computed F-Value</u>
Between Vehicles	10.3178	2	5.15889	58.93710
Between Device within Vehicles	0.06032	3	0.02011	0.22930
Between Tests within Vehicles and Device	1.05218	12	0.08768	

Critical F (3, 12) = 3.4903 (95% confidence level)

Not significant upon 95% confidence level.

TABLE 4

Fuel Economy

Hot-Start CVS-1 Exhaust Emission Tests

Device: Hydro-Catalyst
 Vehicle #1: 1972 Dodge 318 CID, V-8, 2-barrel
 Vehicle #2: 1974 Chev. P.U. 350 CID, V-8, 4-barrel
 Vehicle #3: 1972 Chev. P.U. 225 CID, 6-cyl., 1-barrel

<u>Status Tests</u>	<u>Vehicle #1</u>		<u>Vehicle #2</u>		<u>Vehicle #3</u>	
	<u>Baseline</u>	<u>w/Device</u>	<u>Baseline</u>	<u>w/Device</u>	<u>Baseline</u>	<u>w/Device</u>
1	13.68247	13.73410	11.49567	11.62937	14.38756	14.46170
2	13.70908	13.52329	11.59403	12.12500	14.19325	14.44727
3	13.82234	13.36659	11.69480	11.77532	14.41829	14.81784
	\bar{X} (baseline) = 13.22228		\bar{X} (w/device) = 13.32005			

Analysis of Variance

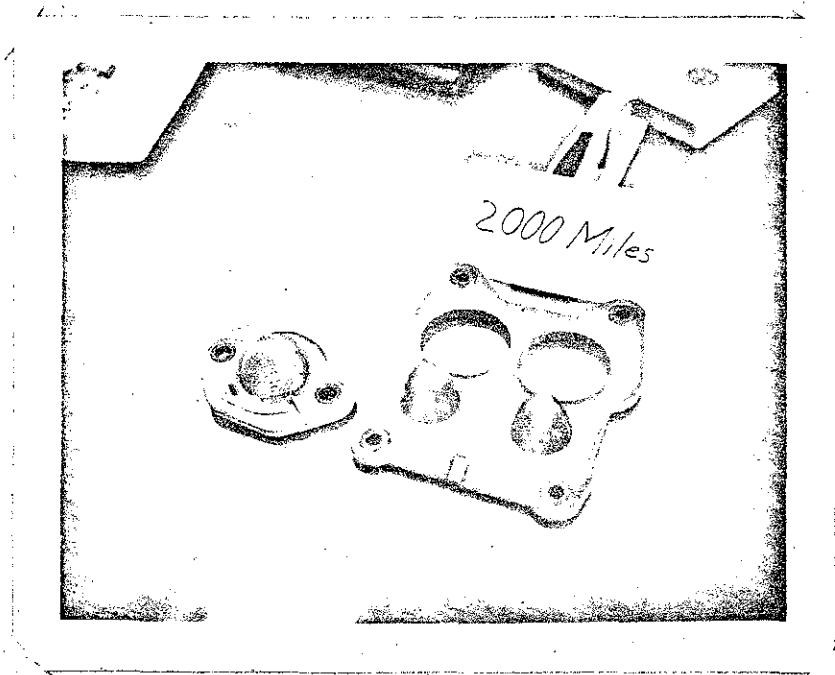
<u>Source of Estimate</u>	<u>Sum of Squares</u>	<u>D.F.</u>	<u>Mean Squares</u>	<u>Computed F-Value</u>
Between Vehicles	23.65917	2	11.82959	408.93742
Between Device within Vehicles	0.23807	3	0.07936	2.74325
Between Tests within Vehicles and Device	0.34713	12	0.02893	

Critical F (3, 12) = 3.4903 (95% confidence level)

Not significant upon 95% confidence level.

FIGURE 1

Photograph of Hydro-Catalyst
Corporation's "Precombustion
Device-California Design" Device



State of California

AIR RESOURCES BOARD

June 11, 1974

Staff Report

Evaluation of Hydro-Catalyst Corporation
"Pre-Combustion" Catalytic Device for
Compliance with the Requirements of
Section 27156 of the Vehicle Code

I. Introduction

The Hydro-Catalyst Corporation, Holmdel, New Jersey has applied for an exemption from the prohibitions of Section 27156 the Vehicle Code for its "Pre-Combustion" catalytic device. Section 27156 prohibits the advertising, sale or installation of any device which reduces the effectiveness of motor vehicle emission control systems. The applicant is requesting that the exemption be granted for 1974 and older model-year vehicles.

II. Device Description and Function

The Hydro-Catalyst Corporation's "Pre-Combustion" device is designed to position a pair of formed screens under (downstream) each carburetor barrel. The applicant produces devices to fit engines with 1-, 2- and 4- barrel carburetors. See Figure 1. The screens are made of fine mesh wire cloth and formed into conical and parabolic shapes. The upstream screen is plated with cadmium and the downstream screen with nickel. The screens are mated in assembly by a mounting gasket

with approximately 1/8 inch space between the screens. The applicant states that physical contact between the screens will destroy the device's catalytic effect.

The mounting gasket is of typical laminated gasket material, i.e., nitrile rubber with asbestos fiber filler. A coating of an electrolytic material is applied between the laminations. Grounding tabs protrude from the electrolytic coating.

In addition to the installation of the device, it is required that the vehicle's OEM engine settings be modified. The installation instructions specify advancing the initial timing up to an additional six degrees. The idle CO is adjusted by leaning the mixture to a constant misfire condition and then enrichening the mixture until only occasional misfires occur.

The applicant states that through catalytic action the device will precondition the air-fuel mixture in such a manner as to promote more efficient combustion. It is claimed that this enhancement is achieved by a precursory effect induced by the device to influence combustion and to lower the vehicle's fuel octane requirement. Removal of engine carbon deposits, reduced air pollution and improved vehicle performance are also claimed. The staff evaluation concerns itself with only the effects of the device on exhaust emissions.

III. Emission Testing

The applicant submitted data obtained from a number of exhaust emission tests. However, the only data which compare the effects of the device with engine adjustments to a baseline vehicle are contained in Scott Research Laboratories' reports SRL 1420 01 0174 and SRL 1420 02 0374. The following are the results of baseline and device cold CVS tests performed on a 1973 Ford Mustang with a 2-barrel carburetor and automatic transmission using Indolene 30 as the test fuel:

	<u>HC</u>	<u>Cold CVS</u> <u>grams/mile</u> <u>CO</u>	<u>NOx</u>
Baseline	2.46	35.66	3.07
Device (Avg. 2 Tests)	2.55	19.50	3.34
Percent Change	(3.66)	(-45.32)	(8.79)

Additional confirmatory tests were performed at the Air Resources Board Laboratory to provide a better understanding of the device's effects. The following vehicles with automatic transmissions were used for the ARB tests:

- 1972 Dodge Pick-up, 225 CID engine with 1-bbl carburetor
- 1974 Dodge Pick-up, 318 CID engine with 2-bbl carburetor
- 1974 Chevrolet Pick-up, 350 CID engine with 4-bbl carburetor

APPENDIX I

A series of three baseline and three device hot CVS tests were performed on each vehicle. The vehicles were adjusted to the applicant's engine setting for the device tests. Indolene 30 was used as the test fuel. The following are the results of the emission tests:

<u>Vehicle</u>	<u>Device Installed</u>	<u>Hot CVS</u> <u>Ave. grams/mile</u>		
		<u>HC</u>	<u>CO</u>	<u>NOx</u>
1972 Dodge 225-IV	No	2.35	32.1	4.34
	Yes	2.77	41.1	4.06
	Percent Change	(17.9)	(28.0)	(-6.5)
1972 Dodge 318-2V	No	2.11	15.2	3.19
	Yes	2.34	6.53	3.90
	Percent Change	(10.9)	(-57.0)	(22.3)
1974 Chev. 350-4V	No	1.56	9.95	1.60
	Yes	3.29	7.82	2.07
	Percent Change	(110.0)	(-21.4)	(29.4)

The inconsistent results obtained with the 225 CID Dodge in comparison with data from the other vehicles were determined by a subsequent investigation to be the result of a malfunctioning carburetor. Consequently, the data obtained from tests of this vehicle are not conclusive.

The data obtained from the other tests indicate that the device adversely affects HC and NOx emissions and beneficially affects CO emissions. These results can be expected as a consequence of advancing the spark timing and excessively leaning the idle mixture ratio.

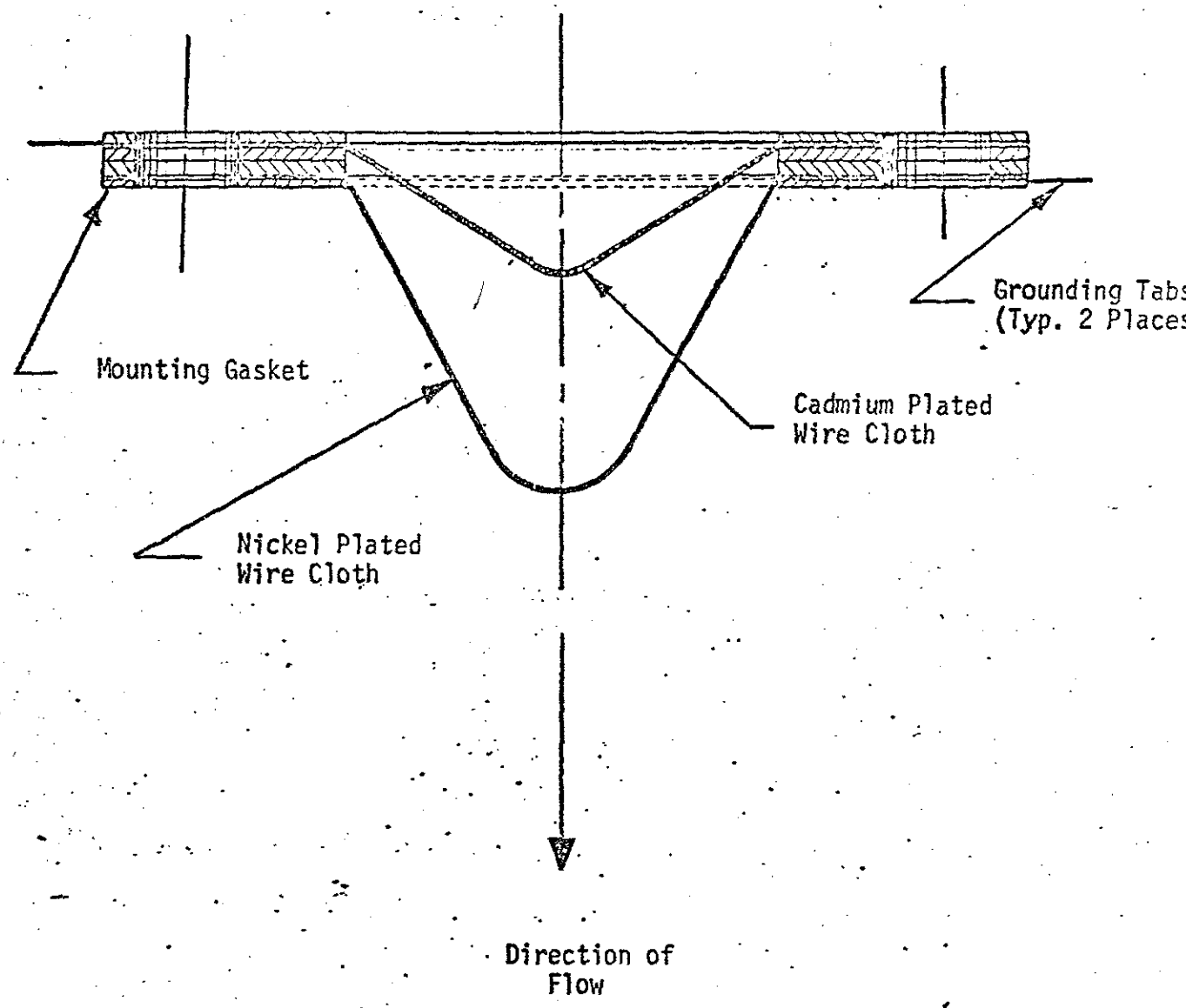
IV. Conclusions and Recommendations

The staff concludes that the timing and idle CO adjustments required with the installation of the Hydro-Catalyst device adversely affect HC and NOx emissions. The leaning of the air-fuel mixture also substantially reduces CO emissions. No emission related effects attributed to the catalyst could be determined in the evaluation.

It is the staff recommendation the Hydro-Catalyst Corporation be denied an exemption to Vehicle Code Section 27156 for its "Pre-Combustion" device for installation on 1974 and older model-year vehicles.

Figure 1

Hydro-Catalyst Corporation's
"Pre-Combustion" Device For
A one-Barrel Carburetor
Installation.



SCOTT RESEARCH LABORATORIES INC.

A SUBSIDIARY OF AMERICAN BIO-CULTURE, INC.

PLUMSTEADVILLE, PENNA. 18949
PHONE 215 766-8861

TABLE 3 - 1972 EPA HOT START.

EXHAUST EMISSION DATA SHEET

Vehicle	1972 Olds Custom Cruiser	Odometer		Date	4/3/72
License	NJ VUV-588	Finish	7100.7	Project	1283-02
Trans.	Automatic	Start	7093.1	Run	2
Carb.	GM bbls. 4	Miles	7.6	Device	Carb. Catalyst
Engine	V8 CID 455	BIT	8° @ 1100 RPM	Dyn. Load	14.2 RHP Actual
Idle RPM	600 (Drive)	Driver	DG	Dyn. Inertia	5500#
Analyst	RS			Calculator	RS
Dry Bulb Temp., F	56.5	Barometric Press., mm Hg	747.87		
Wet Bulb Temp., F	78.5	CVS Pump Press., mm Hg	-11.97		
Gr. Water/Lb. Dry Air	32	(P) Sample Press., mm Hg	735.90		
(K) Factor	.8319	(V) CVS Pump Disp., CFR	.3260		
Sample Temp., R	579.7	(N) CVS Pump Revolutions	24,689		

DILUTE EXHAUST MEASUREMENTS

COMPONENT	PPM/T	FACTOR	GRAMS/MILE	
ppm HC dil.	89.93			
ppm HC air	9.41			
ppm HC exh.	80.52	10217	1.513×10^{-6}	1.24 HC
ppm CO exh.	435		3.054×10^{-6}	13.57 CO
ppm NO				
ppm NO ₂				
ppm NO _x	110.33			
(ppm NO _x) (K)	91.78	10217	5.017×10^{-6}	4.70 NO _x

- NOTES: 1. Lead free Indolene Gasoline.
2. Factory idle mixture (4½ turns from closed)

SCOTT RESEARCH LABORATORIES INC.

A SUBSIDIARY OF AMERICAN BIO CULTURE, INC.

PLUMSTEADVILLE, PENNA. 18949
PHONE 215 766-8861

BEFORE TEST - ALSO BEFORE ENGINE DEPOSIT NORMALIZATION

TABLE 1 - 1972 EPA COLD START

EXHAUST EMISSION DATA SHEET

Vehicle	1972 Oldsmobile Custom Cruiser	Odometer		Date	2/22/72 ✓
License	NJ VUV-588	Finish	4186.7	Project	1283-00
Trans.	Automatic	Start	4179.0	Run	#1
Carb.	GM bbls. 4	Miles	7.7	Device	None
Engine	V8 CID 455			Dyn. Load	14.2 RHP @ 50 mph
Idle RPM	600-Dr., 1100-Neutral	BIT	8.5° BTDC	Dyn. Inertia	5500 #
Analyst	WHS	Driver	DG	Calculator	DG

Dry Bulb Temp., F	75
Wet Bulb Temp., F	57
Gr. Water/Lb. Dry Air	40
(K) Factor	.8587
Sample Temp., R	579.7

Barometric Press., mm Hg	748.97
CVS Pump Press., mm Hg	12.34
(P) Sample Press., mm Hg	736.63
(V) CVS Pump Disp., CFR	.3260
(N) CVS Pump Revolutions	24615

DILUTE EXHAUST MEASUREMENTS

COMPONENT	PVN/T	FACTOR	GRAMS/MILE	
ppm HC dil.	105.89			
ppm HC air	15.95			
ppm HC exh.	89.94	10197	1.513 x 10 ⁻⁶	1.39 HC
ppm CO exh.	565	10197	3.054 x 10 ⁻⁶	17.59 CO
ppm NO				
ppm NO ₂				
ppm NO _x	151.72			
(ppm NO _x) (K)	130.3	10197	5.017 x 10 ⁻⁶	6.67 NO _x