

Preliminary Report - UOP Catalyst and  
Dana EGR Applied to Medium Duty Vehicles

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## Background

Medium duty vehicles (6,000 to 10,000 pounds GVW) have been shown to have many operational similarities to light duty vehicles. Additionally, state authorities have expressed interest in retrofit control for this vehicle class. Some preliminary investigation into the feasibility of retrofitting this class of vehicles is described in ECTD report 74-10, September 1973. Based on these early encouraging results, a durability program was undertaken using the Dana Retronox EGR system and UOP oxidizing catalysts. The objective of this program was to accumulate 25,000 miles with testing done at EPA every 4,000 miles. Dana and UOP did provide vehicles, retrofit hardware, and a test track for mileage accumulation.

## Device Description

The Dana Retronox EGR system and UOP oxidizing catalysts were installed on a 1973 Ford F-250 pick-up truck with a 360 CID engine and automatic transmission, and a 1973 Chevrolet C-50 stake truck with a 350 CID engine and automatic transmission. A detailed operational description of both the Dana Retronox system and the UOP catalysts can be found in report 74-10.

## Test Program

Tests were performed on the trucks in three configurations: stock or baseline only, and the EGR system plus catalyst configurations. Tests were conducted according to the 1975 FTP as described in the November 15, 1972, Federal Register. 4,000 miles were accumulated on the vehicles at the Dana track. The vehicles were again tested after this mileage accumulation using the 1975 FTP.

## Results

A summary of results from this testing is given in Table I. At low mileage, the reductions in the emissions levels were consistent with those reported in 74-10. However, after 4,000 miles, the emission levels had risen to levels similar to those reported with the EGR system only at zero device miles. Analysis by UOP indicated that the catalysts had been poisoned by lead from the fuel. Analysis of the fuel showed that the "no-lead" fuel was near the upper limit in the EPA specifications for lead content (.05 gm/gal). UOP

reported that though their catalyst had high mechanical strength and durability, it was sensitive to even this amount of lead. UOP has supplied a less sensitive catalyst for future tests of their system.

### Conclusions

Low mileage emissions were similar to those previously reported for an EGR/catalyst retrofit. The catalysts substantially failed at low mileage.

TABLE I  
 Summary of Test Results  
 Using Dana EGR Systems and UOP Catalysts

Chevrolet C-50 Stake Body Truck

<u>Date</u>	<u>HC (gm/mi)</u>	<u>CO (gm/mi)</u>	<u>NOx (gm/mi)</u>	<u>MPG</u>	<u>Remarks</u>
9-20	7.14	115.95	7.87	6.4	Baseline
9-25	5.25	77.43	7.82	6.7	Baseline
AVG.	6.20	96.69	7.85	6.5	Baseline
9-27	3.77	65.92	5.00	6.3	Dana EGR
9-28	3.48	72.70	5.40	6.5	Dana EGR
AVG.	3.62	69.31	5.20	6.4	Dana EGR
% Reduction from Baseline for Dana EGR System					
	41%	28%	34%	1.5%	
10-31	.45	55.04	2.60	4.9	EGR + UOP cat.
11-1	.29	28.60	2.16	6.4	EGR + UOP cat.
AVG.	.37	41.82	2.38	5.6	EGR + UOP cat.
% Reduction from Baseline for Dana EGR & UOP Catalyst System					
	94%	56%	70%	14%	
12-4	2.06	48.6	8.32	5.8	Full Systems + 4000 miles
% Reduction from Baseline after 4000 miles					
	67%	50%	-6%	12%	

TABLE II  
 Summary of Test Results  
 Using Dana EGR Systems and UOP Catalysts

Ford F-250 Pick-up Truck

<u>Date</u>	<u>HC (gm/mi)</u>	<u>CO (gm/mi)</u>	<u>NOx (gm/mi)</u>	<u>MPG</u>	<u>Remarks</u>
9-21	2.81	55.91	5.73	9.3	Baseline
9-24	2.65	57.00	6.08	9.3	Baseline
AVG.	2.73	51.45	5.90	9.3	Baseline
9-27	3.86	90.73	4.88	6.7	Dana EGR
9-28	2.72	66.70	3.60	9.1	Dana EGR
AVG.	3.29	83.71	4.24	7.9	Dana EGR
% Reduction from Baseline for Dana EGR System					
	-20%	-59%	28%	15%	
10-11	.59	11.44	3.13	9.2	EGR + UOP cat.
10-12	.69	11.47	3.42	8.9	EGR + UOP cat.
AVG.	.64	11.46	3.27	9.1	EGR + UOP cat.
% Reduction from Baseline for Dana EGR & UOP Catalyst System					
	76%	78%	44%	2%	
11-1	2.60	77.41	4.06	8.7	Full system
11-2	2.37	62.63	4.27	9.0	+ 4000 miles
AVG.	2.48	70.02	4.16	8.9	" "
% Reduction from Baseline after 4000 miles					
	9%	-27%*	30%	4%	

\*A minus sign indicates an increase rather than reduction.