

How Seeps Were Investigated in the Test Program for Cleaner-Burning Gasoline

Summary

In mid-1994, the California Air Resources Board (ARB) formed an Advisory Committee to oversee the implementation of the cleaner-burning gasoline program. Under the guidance of the Performance Subcommittee of the Advisory Committee, cleaner-burning gasoline was tested in over 800 vehicles over a six month period. At the same time, a control fleet of over 600 vehicles was operated on conventional gasoline. All vehicles in both the test and control fleets were inspected by ARB employees and by fleet personnel as part of the normal maintenance procedures. Early inspections revealed that a number of vehicles in both the test and control fleets showed evidence of seeps on a variety of vehicle components. Because of ARB's concern over seeps, the test program was augmented to include the evaluation of the occurrence of seeps to determine if cleaner-burning gasoline was a potential cause of seeps on vehicles.

A "seep" is defined as a **wet spot**, **wetness** or a **stain** near a gasket, seal, or fitting. Wetness could indicate that fuel may have "seeped" from this area under some operating conditions. Wetting on the exterior of an engine component may also be caused by other fluids such as motor oil, engine coolant, or power steering fluid. Seeps are a fairly common occurrence, and, in the absence of evidence of an ongoing fluid leak, are not normally the reason for repair or maintenance. Also, during the test program no vehicles were removed from service due to seeps. A "seep" is differentiated from a "drip" or "leak" by the fact that no actual fuel is observed at the time of inspections.

The evaluation of seeps is presented in the Chapter IV, Part One of the report of the Performance Subcommittee of the California Reformulated Gasoline Advisory Committee. The relationship of seeps to cleaner-burning gasoline was investigated by the ARB staff and a task group of independent experts from Chrysler, Ford and General Motors. The task group concluded that the observed seeps were normal occurrences and not the result of the use of cleaner-burning gasoline. The attached November 1, 1995, letter from Dr. Loren K. Beard of the Chrysler Corporation summarizes the committee's conclusions that "based on the review of these findings... the task group recommends that the "seeps" identified in both the conventional and CP2 (cleaner-burning gasoline) fueled fleets be considered "not fuel related", and removed from further consideration in the analysis of fuel-related incidents in the program."

Introduction

As part of the performance and compatibility test program the ARB motor vehicle inspectors performed fuel system and engine component inspections. During these inspections, seeps were reported in both the test and control fleets at the start of the test program, during the test program, and at the end of the test program. These reported seeps were then further evaluated by an industry task group to investigate the issue and make recommendations on the nature and cause of these seeps. The following presents the investigations and results.

ARB Inspections

During the test program, ARB staff conducted initial (before cleaner-burning gasoline was supplied) and subsequent bi-monthly fleet inspections of the fuel systems on both the test and control fleets. These

inspections are documented on Vehicle Description Forms and Fuel System Inspection Logs, all of which are available for review as part of the test program database. The initial inspections were conducted to identify pre-existing vehicle and vehicle fuel systems conditions before test vehicles were fueled with cleaner-burning gasoline.

The initial inspections noted a substantial number of vehicles with seeps in both the test and control vehicles. During the test program, additional seeps were found to occur on both test and control vehicles. Both the test and control vehicles experienced a number of new seeps at a rate of about 5 percent. Also, it was discovered that some of the seeps noted in prior inspections were not present in later inspections. In most cases, these vehicles were not serviced in any manner that would affect seeps. This indicated that seeps are not necessarily a constant or worsening situation. As evidence of this, the presence of seeps alone did not cause the fleet mechanics to take vehicles out of service. However, in order to ensure that the occurrence of seeps was fully understood, a task group was requested to investigate if seeps were occurring as a result of cleaner-burning gasoline.

Task Group Inspections

Because of the ARB's concern over reported seeps in both the test and control vehicles, the Technical Review Panel, the group established by the Performance Subcommittee to evaluate all fuel performance issues, created a special task group to determine if the occurrence of seeps could be related to cleaner-burning gasoline. This task group was lead by Dr. Loren K. Beard of the Chrysler Corporation, a recognized expert in the field of automotive fuel systems. Dr. Beard was assisted in the field by the ARB and General Motors technicians and by experts from General Motors and Ford in reviewing the results. The task group, inspected seeps on both the test and control fleets. Also, the task group, in parallel, investigated seeps on similar mileage and age vehicles in the Detroit area.

Results

- The seeps in both the test and control fleets occurred at a similar frequency.
- The industry task group concluded that the seeps observed do not represent an abnormal condition. The results of the task group are attached in the letter from Dr. Loren K. Beard, dated November 1, 1995.
- From the results of the General Motors inspection of seeps at the Bank of America fleet, the described seep condition in no way affects the vehicles performance or durability as reported in the letter dated July 21, 1995, from the Service Technology Group in the General Motors Corporation.
- Many of the seeps that were evaluated in the California fleets may not be fuel related at all. Many seeps appeared to be motor oil, or other vehicle fluids, such as, power steering fluid or engine coolant.
- In both the California and Michigan based vehicles, carburetors, fuel pumps, and fuel filters seem to be areas where dust and grime accumulate, without any evidence of actual fuel leaks. The task group identified similar accumulations of "grime" near PCV and EGR fittings, coolant and power steering fluid hoses and lines, and master cylinders.
- The task group recommended that the seeps identified in both the test and control fleets be considered "not fuel related," and removed from further consideration in the analysis of fuel-related incidents in the test program.
- The Technical Review Panel, consisting of 19 experts in automotive engineering, repair or fuels representing 8 organizations, reviewed and accepted the task group's recommendation. The Technical Review Panel then presented the recommendation to the Performance Subcommittee. With approval of the subcommittee, the report of the Performance Subcommittee of the California

Reformulated Gasoline Advisory Committee presented the results as recommended by the task group in Chapter IV, Part One.

Questions

Question: Are seeps a significant safety concern?

Answer: No, seeps as categorized by ARB inspectors commonly occur in vehicles. They are generally regarded as normal and are not viewed as something requiring immediate, corrective action.

Question: Were any of the documentation of inspection results destroyed?

Answer: All results were preserved so that they could be fully analyzed. All data was subject to normal quality assurance tests so that clearly erroneous information could be corrected or excluded from the analysis process.

Question: During the Performance Test Program, an issue about a possible safety problem due to seeps for the Bank of America came up. How was that handled?

Answer: General Motors provided a factory field representative to investigate the reported seeps for the Bank of America fleet. The General Motors representative found that both the test and control Bank of America fleets were normal. That is the seeps were observed in both fleets and were normal occurrence for vehicles of that age and service. The results were documented in the July 21, 1995 letter (attached).

Attachments

CHRYSLER CORPORATION Chrysler Technology Center

November 1, 1995

Dean Simeroth
Chief, Criteria Pollutants Branch
California Air Resources Board
2020 L Street Sacramento, CA 95814

Dear Mr. Simeroth,

As part of its program to evaluate the performance of California Phase 2 reformulated gasoline (CP2), Air Resources Board (ARB) inspectors have examined the fuel system integrity. Vehicles operating on both conventional gasoline and CP2 were examined. During the course of these examinations, the inspectors identified a number of "seeps" in vehicles from both the conventional and CP2 populations. As we understand it, a "seep" may be a wet spot or a stain near a gasket, seal, or fitting, suggesting that fuel may have "seeped" from this area under some operating conditions. A "seep" is differentiated from a "drip" or "leak" by the fact that no actual fuel is observed at the time of inspection.

Our task group has been asked to evaluate these "seeps" to determine whether, collectively, they appear to be abnormal. To that end, we have visited some of the California fleets operating on both conventional and CP2 gasoline, and have evaluated some similar mileage and age vehicles here in the Detroit area. Based on these evaluations, we conclude that the "seeps" do not represent an abnormal condition. In particular, many of the seeps that were evaluated in the California fleets, may not be fuel related at all. Some appeared to be motor oil, others possibly brake fluid or coolant. In both the California and Michigan-based

vehicles, carburetors, fuel pumps, and fuel filters seem to be areas where dust and grime accumulate, without any evidence of actual fuel leaks. Also, similar accumulations of "grime" were identified near PCV and EGR fittings, coolant and power steering fluid hoses and lines, and master cylinders.

Based on a review of these findings with my colleagues at Ford and General Motors, the task group recommends that the "seeps" identified in both the conventional and CP2 fueled fleets be considered "not fuel related", and removed from further consideration in the analysis of fuel-related incidents in the program.

Sincerely,

Signed

Loren K. Beard, PhD
Fuels Specialist
Chrysler Corporation

cc:

Jerry Barnes, General Motors
Brian Rippon, Ford

STG
GM Service Technology Group

July 21, 1995

TO: Keith Macias, California Air Resources Board (CARB)

FROM: John Stott, G.M. S.T.G. Field Engineering

SUBJECT: B of A Fleet

On July 7th I visited the Bof A service garage in downtown Los Angeles. Keith Macias of the CARB had contacted me and asked if I would assist in inspecting several vehicles with reported fuel seepage. I inspected the vehicles with Keith, representatives from B of A, and the EPA inspectors that had reported the problem.

The problem reported by the inspectors was a dampness, or seepage, on the front throttle bodies on the fleets Astro vans. The inspectors noted that they had not seen this condition on the vehicles at the start of the test. It should be noted however, that these vehicles had very low mileage on them at the start of the test.

Our inspection revealed a build up of road dirt and debris on the front of the throttle bodies. This condition is not uncommon on this type of vehicle. The condition is most apparent on vehicles used in hot and/or dusty climates. While this condition was apparent on all of the same type of vehicles that we looked at, it was also apparent on all of the same type of vehicles that we looked at in the control fleet. As an extra precaution we looked at vehicles not involved in the ARB testing and they also had the same condition.

I would not hesitate to recommend that these vehicles be kept in service. The described condition in no way affects the vehicles performance or durability.

Sincerely,

Signed

John Stott
STG Engineering