United States General Accounting Office

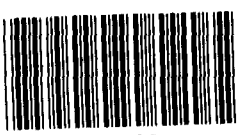
GAO

Report to the Chairman, Subcommittee on Oversight and Investigations, Committee on Energy and Commerce, House of Representatives

June 1991

AIR POLLUTION

New Approach Needed to Resolve Safety Issue for Vapor Recovery Systems



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GAO

United States
General Accounting Office
Washington, D.C. 20548

Resources, Community, and
Economic Development Division

B-244224

June 28, 1991

The Honorable John D. Dingell
Chairman, Subcommittee on
Oversight and Investigations
Committee on Energy and Commerce
House of Representatives

Dear Mr. Chairman:

This report responds to your request that we determine the actions taken by the Environmental Protection Agency (EPA) and the Department of Transportation's National Highway Traffic Safety Administration (NHTSA) to resolve the safety issue associated with vehicle-based (onboard) vapor recovery systems. The report also discusses future efforts to resolve upcoming regulatory issues, such as those concerning alternative fuels, mandated by the Clean Air Act Amendments of 1990.

Unless you publicly release its contents earlier, we plan no further distribution of this report until 30 days from the date of this letter. At that time, we will send copies of the report to appropriate congressional committees; the Administrator, EPA; the Secretary of Transportation; the Administrator, NHTSA; the Director, Office of Management and Budget; and other interested parties. We will make copies available to others upon request.

This work was performed under the general direction of Richard L. Hembra, Director, Environmental Protection Issues, who may be reached at (202) 275-6111. Other major contributors to this report are listed in appendix I.

Sincerely yours,

J. Dexter Peach
Assistant Comptroller General

Executive Summary

Purpose

Gasoline vapors from motor vehicles contribute to smog and can aggravate respiratory problems for millions of Americans. An estimated 554,500 metric tons of hydrocarbon emissions, a key component of smog, escape into the atmosphere each year when vehicles are being refueled. In 1987 the Environmental Protection Agency (EPA), recognizing this threat, proposed a regulation requiring that motor vehicles be equipped with onboard systems to control about 90 percent of the refueling vapors. Concerns about the safety of these systems raised by the Department of Transportation's National Highway Traffic Safety Administration (NHTSA) prevented the approval of the regulation.

The Clean Air Act Amendments of 1990, however, mandated that EPA issue a regulation by November 1991 requiring that onboard vapor recovery systems be phased in beginning 4 years later, or on model year 1996 motor vehicles. Concerned about the safety of the proposed onboard systems, the Chairman, Subcommittee on Oversight and Investigations, House Committee on Energy and Commerce, requested GAO to determine EPA and NHTSA actions to resolve the safety issue that NHTSA believes is associated with onboard vapor recovery systems.

Background

The gasoline vapors released during refueling are a major uncontrolled source of pollution from motor vehicles. The Clean Air Act Amendments of 1990 require controls both on gasoline pumps and on the vehicle to reduce refueling vapors. Gasoline-station-based controls, referred to as Stage II controls, capture refueling vapors at the pump. Vehicle-based controls, or onboard systems, capture refueling vapors in the vehicle's fuel system. EPA envisions Stage II controls as an interim step until onboard systems can be phased in. EPA estimates that adding onboard systems will provide nationwide control of refueling vapors by 2010.

EPA is responsible for developing regulations to reduce emissions from motor vehicles. EPA also has a public safety responsibility for the effects of its regulations. NHTSA is responsible for ensuring the safety of motor vehicles. Future regulations involving alternative fuels like methanol, ethanol, and natural gas will also require coordination between EPA and NHTSA to resolve similar environmental and safety issues.

Results in Brief

EPA and NHTSA have not developed an approach to resolve their 4-year impasse over whether onboard vapor recovery systems will increase the likelihood of vehicle crash fires and fuel spillage. As a result, no agreement has been reached about the data and analysis needed to address

the safety risk of onboard systems. For example, EPA has been waiting for additional analysis from NHTSA to support NHTSA's position that the systems could be unsafe. However, NHTSA believes that it must base its views about safety on performance data from testing vehicles equipped with onboard systems. Automakers have not developed these systems yet.

On the basis of the currently available data, EPA does not believe that onboard systems pose an unreasonable risk to the public. However, if the impasse between EPA and NHTSA is not resolved, the use of onboard systems could be delayed beyond the 1996 model year. This would also delay environmental benefits and could result in unsafe cars if NHTSA's safety concerns are found to be valid but are not corrected before the systems are installed on cars. Promulgating the onboard regulation could encourage automakers to develop vehicles that NHTSA can test.

An agreed-on approach that would define EPA's and NHTSA's roles and responsibilities, the tests and analysis to be performed, what the analysis will accomplish, and time frames for these activities could help the agencies ensure that safety defects or flaws are identified and corrected before the 1996 model year. Further, such an approach could be used by EPA and NHTSA as a framework for resolving future differences that may arise over the safety issues and environmental benefits of pending regulations, such as those for the use of alternative fuels.

Principal Findings

Safety Concerns With Onboard Systems Are Not Resolved

In 1987 EPA's belief that onboard systems would be safe and its intention to require these systems to control refueling vapors was met with concern by NHTSA. NHTSA cited increased crash fires and fuel spillage as two potential safety problems associated with onboard systems. As a result of NHTSA's concerns, the Office of Management and Budget, which is responsible for assessing the costs and benefits of federal regulations, would not approve EPA's proposal to require onboard systems. EPA and NHTSA have been unsuccessful in resolving their disagreement on the safety concerns over the last 4 years.

The Clean Air Act Amendments of 1990 require EPA to consult with NHTSA on the safety of onboard systems. Since passage of the amendments, EPA and NHTSA have met to discuss NHTSA's safety concerns. Nevertheless, as of June 1991, the agencies have not developed an approach to resolve their differences.

Without such an approach, EPA and NHTSA have not defined their roles or agreed on the information and analysis needed to address the safety concerns. After consultation with NHTSA in January 1991, EPA expected NHTSA to provide a detailed safety analysis of onboard systems. In response, NHTSA restated its earlier position without additional analysis.

In May EPA requested NHTSA to provide further analysis on its safety concerns. NHTSA, however, has been reluctant to do so because it typically does not test vehicle components until they are installed on cars. NHTSA says it cannot quantify the safety risk associated with onboard systems until manufacturer-produced systems are available. NHTSA also maintains that meaningful testing can be done only on manufacturers' onboard-equipped vehicles that will meet the 1994 federal tailpipe emission standards.

Future Regulations Raise Similar Concerns

Over the next decade, the auto industry will be required to make various changes under provisions of the Clean Air Act Amendments. Requirements such as the use of alternative fuels for motor vehicles could raise safety concerns similar to those for onboard systems.

While the use of alternative fuels will not be required for several years, industry and interest group representatives believe that EPA and NHTSA need to have an action plan in place for addressing safety-related concerns. In discussions with EPA and NHTSA officials, GAO found that no such plans are being formulated.

Recommendations

GAO recommends that the Administrator of EPA go forward with the onboard regulation by November 1991 as required by the Clean Air Act Amendments of 1990 unless EPA determines that onboard systems pose an unreasonable risk to public safety. GAO also recommends that the Administrator of EPA, and that the Secretary of Transportation direct the Administrator of NHTSA to, develop a joint approach, or action plan, to perform a safety evaluation of manufacturers' onboard systems to identify and correct any safety defects or flaws well in advance of the 1996 model year so that an orderly phase-in occurs. As part of the plan,

GAO recommends that EPA and NHTSA work with the automobile industry during the 4 years between promulgation of the regulation and the phase-in of onboard systems called for by model year 1996. At a minimum, this plan should identify the roles and responsibilities of each agency, the safety tests and analysis to be performed, what the analysis will accomplish, and the time frames for performing the analysis.

Agency Comments

GAO discussed the factual information in this report with EPA and NHTSA officials, and the officials generally agreed with the facts presented. We incorporated their comments where appropriate. However, as requested, GAO did not obtain official agency comments on a draft of this report.

Contents

Abbreviations

EPA	Environmental Protection Agency
GAO	General Accounting Office
NHTSA	National Highway Traffic Safety Administration
OMB	Office of Management and Budget

Introduction

Gasoline vapors from motor vehicles contain components that, when combined with other pollutants, can aggravate respiratory problems. The public is exposed to these vapors on a daily basis as gasoline evaporates from vehicle fuel systems and during refueling. The Environmental Protection Agency (EPA) has attempted to reduce the adverse effects of gasoline vapors by requiring controls for evaporative emissions on motor vehicles. The Clean Air Act Amendments of 1990 require that refueling emissions be controlled both at the gas pump and on the vehicle.

Harmful Effects of Gasoline Vapor

Gasoline vapors contain elements that contribute to ozone formation. Ozone, commonly referred to as smog, continues to be the nation's worst air quality problem. Ground-level ozone differs from the beneficial ozone in the upper atmosphere, which protects the earth from harmful radiation. Ozone irritates the nose, throat, and lungs and may lead to permanent lung damage. Ozone forms when hydrocarbons from pollution sources, such as gasoline vapors, react chemically with other pollutants in the presence of sunlight. Despite increasingly stringent control efforts to reduce ozone levels, including stricter tailpipe emission standards and vehicle inspection programs, a number of metropolitan areas still exceed the national air quality standard for ozone. These areas are commonly referred to as nonattainment areas. According to EPA, as of 1989 over 66 million people were living in ozone nonattainment areas.

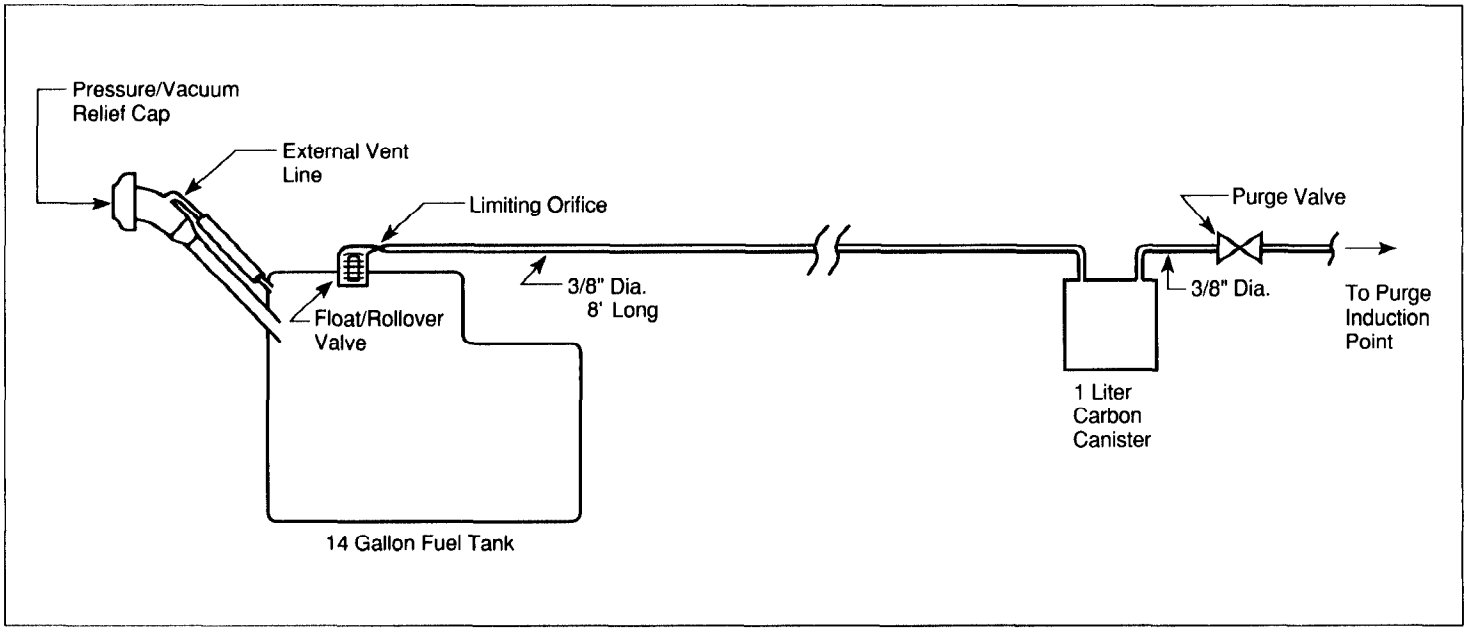
EPA has historically attempted to address the nation's ozone problem by taking actions to reduce the level of hydrocarbons—one of the most reactive chemicals contributing to ozone formation. EPA estimates that hydrocarbon emissions in 1989 totaled approximately 18.5 million metric tons nationwide. Motor vehicles are the largest single source of hydrocarbon emissions, accounting for 5.1 million metric tons, or 28 percent, of hydrocarbons annually. Another major source of hydrocarbon emissions is organic solvent evaporation from dry cleaning and consumer household products.

Types of Gasoline Vapor Emissions and Their Controls

Motor vehicles produce two types of gasoline vapor emissions—evaporative and refueling. Evaporative emissions are gasoline vapors that form as the result of fuel evaporation in the vehicle's fuel system. Since 1971 EPA has required automakers to equip motor vehicles with systems to control evaporative emissions. Evaporative systems control such emissions by restricting the escape route for vaporized gasoline (see fig. 1.1). When the vehicle's gas cap is in place, evaporating gasoline escapes

through a valve at the top of the gas tank, through a vapor line, and into a carbon-filled canister where it is stored. When the vehicle is operated, stored vapors are sucked through a vapor line into the engine. The engine then burns the hydrocarbon vapors as fuel in a process known as purging. Although evaporative systems successfully capture vapor while the vehicle is operating, they do nothing to control hydrocarbons that escape from the gas tank when the vehicle is refueled.

Figure 1.1: Evaporative Emission System



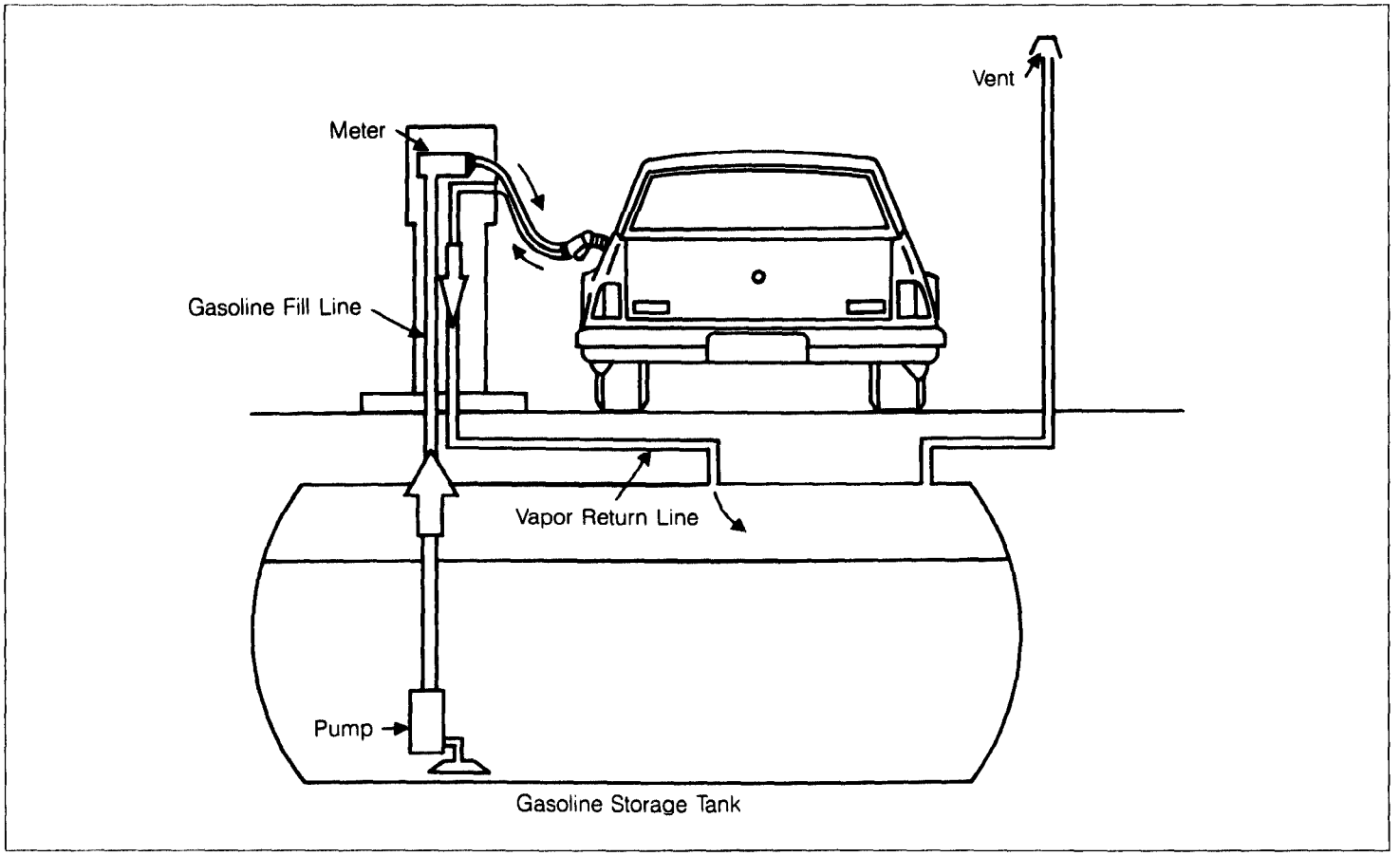
Source: EPA.

Refueling emissions occur when gasoline vapors in the vehicle's tank are displaced by incoming fuel and escape into the atmosphere. EPA estimates that 554,500 metric tons, or about 11 percent, of the 5.1 million metric tons of hydrocarbon emissions attributable to motor vehicles annually come from gasoline vapors that escape into the atmosphere when vehicles are refueled. Refueling emissions can be controlled by installing special devices, known as Stage II controls, on gasoline pumps or by equipping vehicles with onboard vapor recovery systems. Although the two methods have a similar purpose, they function in different ways.

As shown in figure 1.2, Stage II controls for capturing refueling emissions at pumps use a specially designed hose to capture vapors during

vehicle refueling and return them to the underground gasoline storage tank. Our October 1989 report on gasoline vapor control contains more detailed information on Stage II controls.[1] Twenty-six counties in California and the District of Columbia voluntarily established Stage II requirements for gasoline pumps in the early 1970s. Several other states and cities adopted Stage II programs prior to passage of the Clean Air Act Amendments of 1990 in an effort to reduce ozone levels to federally allowable limits.

Figure 1.2: Stage II Control System



Source: EPA.

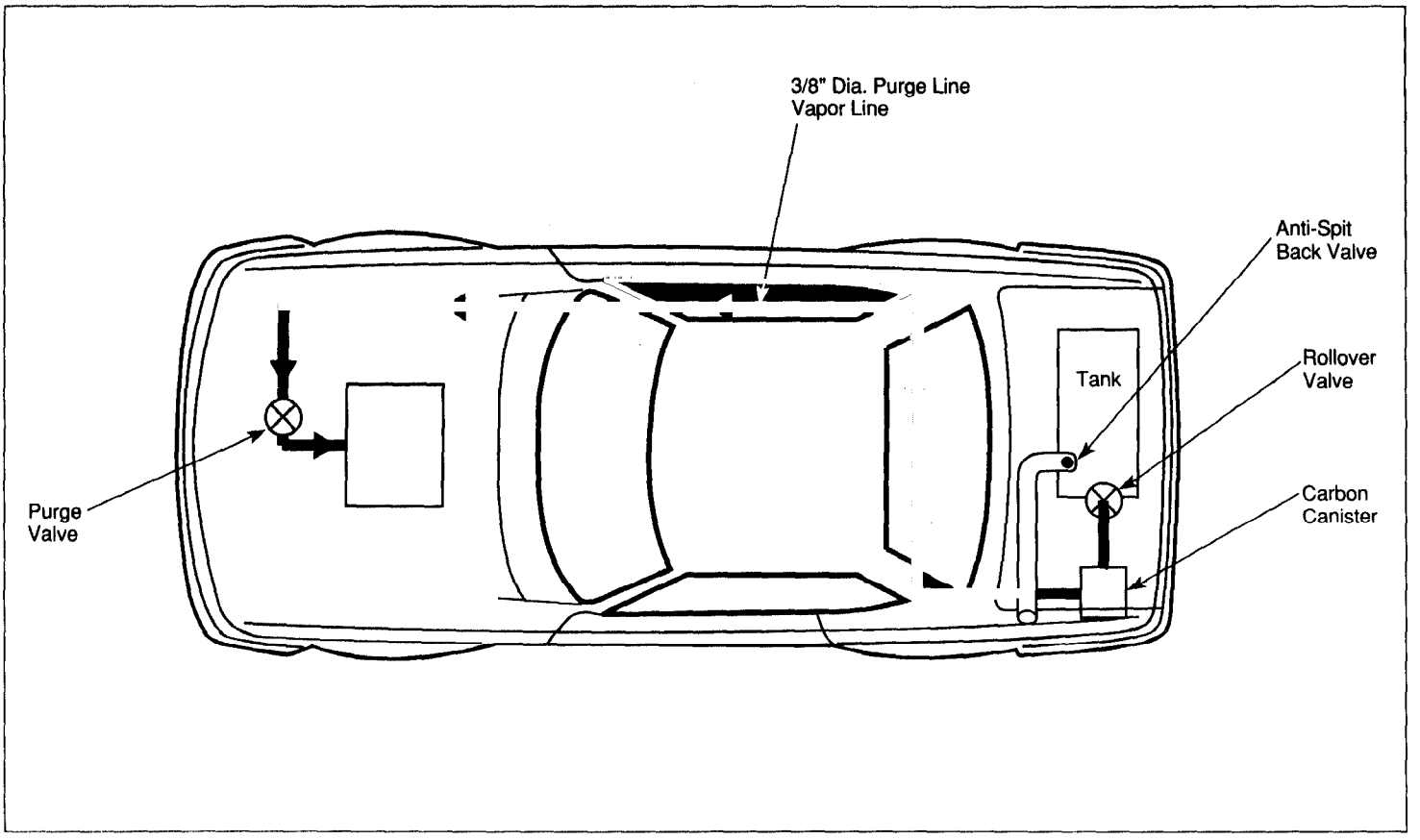
EPA supports using Stage II controls in nonattainment areas as an interim step for controlling refueling emissions until vehicles equipped

[1] Air Pollution: EPA's Efforts to Control Gasoline Vapors From Motor Vehicles (GAO/RCED-90-21, Oct. 6, 1989).

with onboard systems are in use nationwide. According to EPA, Stage II programs will help control refueling emissions in nonattainment areas in the near term because the technology to produce Stage II devices is available and can be implemented today. In the long term, EPA believes that onboard systems will be more effective because the systems will provide comprehensive coverage throughout the nation to control refueling emissions. However, onboard systems are to be phased in over several years and nationwide coverage will not occur until a substantial portion of the vehicles are equipped with onboard systems. EPA estimates this could take up to 15 years.

Although a number of prototype onboard designs have been developed since the late 1970s, no production vehicles have yet been equipped with onboard systems. EPA's most recently designed onboard system, like evaporative systems, use a carbon-filled canister to trap gasoline vapors. Unlike evaporative systems and Stage II devices, onboard systems trap both evaporative and refueling emissions. In onboard systems, a mechanical or liquid seal in the vehicle fill-pipe prevents vapors from escaping during refueling and forces them towards the canister for storage (see fig. 1.3). These vapors are eventually purged into the engine, where they are burned. Because onboard systems must capture substantially more vapor than evaporative systems, they require larger vapor lines, a bigger canister, and improved purging capabilities.

Figure 1.3: EPA's Integrated Onboard Vapor Recovery System



Source: Failure Analysis Associates.

Congressional Actions to Control Refueling Emissions

In 1977 the Congress directed EPA to study the feasibility and desirability of onboard vapor recovery systems as a means of controlling refueling vapors. The Congress further instructed EPA to consult with the Department of Transportation's National Highway Traffic Safety Administration (NHTSA) on the safety of onboard systems. NHTSA is responsible for improving highway safety and reducing fatalities and injuries resulting from motor vehicle accidents. As such, NHTSA's responsibilities include establishing motor vehicle safety standards, investigating consumer complaints about unsafe vehicles, and recalling vehicles the agency discovers to be unsafe.

In 1987, 10 years after the Congress first directed EPA to study onboard systems, EPA issued a notice of proposed rulemaking requiring that onboard systems be installed on motor vehicles. NHTSA's concerns about

the safety of onboard systems, however, prompted the Office of Management and Budget (OMB)—which is responsible for assessing the costs and benefits of federal regulations—to halt the proposed regulation until these safety concerns were addressed. Subsequent EPA actions to address the safety issue did not resolve the concerns to NHTSA's satisfaction.

The Clean Air Act Amendments of 1990 require both Stage II controls and onboard systems to control refueling emissions. Section 202(a)(6) of the amended act directs EPA to consult with NHTSA and to issue a regulation by November 15, 1991, requiring automakers to install onboard vapor recovery systems by phasing in onboard systems on new automobiles beginning 4 years from the date the regulation is promulgated. On the basis of this legislative schedule, onboard systems would be phased in on new vehicles beginning in model year 1996. These vehicles generally should be available for sale to the public in the second half of 1995. Section 182(b)(3) of the act requires ozone nonattainment areas to implement Stage II programs beginning in 1993. However, if an onboard regulation is promulgated, moderate ozone nonattainment areas will not have to implement Stage II controls. In addition, EPA can suspend the Stage II requirement for those nonattainment areas with more serious ozone problems. EPA can suspend this requirement once it determines that onboard systems are in widespread use throughout the nation.

The onboard provision in the 1990 amendments requires EPA to consult with NHTSA on the safety of onboard systems before promulgating the final regulation. Also, under section 202 (a)(4) of the Clean Air Act, EPA cannot require a vehicle component or element of design that causes or contributes to an unreasonable risk to public safety. Given the previous differences between these agencies, it is not surprising that the safety of onboard systems is once again an issue.

Objective, Scope, and Methodology

The Chairman, Subcommittee on Oversight and Investigations, House Committee on Energy and Commerce, expressed concern about the consultation process between EPA and NHTSA and asked us to determine actions taken by EPA and NHTSA to resolve the safety issue associated with onboard vapor recovery systems.

To provide perspective on this issue, we examined documents and reports on onboard systems in EPA and NHTSA's public dockets and discussed the ongoing safety debate over onboard vapor recovery systems with a number of knowledgeable officials. Included in these discussions

were representatives of EPA; NHTSA; the Motor Vehicle Manufacturers Association, a trade group representing domestic automakers; the Association of International Automobile Manufacturers, a trade group representing foreign automakers; the Natural Resources Defense Council, an environmental group; and the American Petroleum Institute, a trade group representing the oil industry that was active in the onboard safety debate.

In addition, we interviewed motor vehicle safety experts from the Insurance Institute for Highway Safety, a research organization that studies motor vehicle safety issues, and the Center for Auto Safety, a nonprofit motor vehicle safety advocacy group. We also interviewed representatives of Arthur D. Little, Inc., which studied onboard safety under contract to NHTSA, and Battelle, which studied onboard safety under contract to EPA. We did not assess the safety of onboard systems.

We interviewed EPA and NHTSA officials involved in consultations and discussed the requirements of the 1990 amendments and their agencies' responsibilities, past involvement, and plans to resolve the outstanding safety issue. We also discussed with EPA and NHTSA officials the implications of EPA's deadline for issuing a regulation for onboard systems by November 1991, and explored options EPA may have for implementing onboard systems within the legislative time frame. We also discussed this regulatory issue with officials from OMB.

We discussed the availability of and time frames for developing onboard hardware suitable for testing with representatives from Ford Motor Company, Chrysler Motor Corporation, and General Motors Corporation. We discussed the liability implications of the onboard regulation with officials from Ford, General Motors, and Chrysler; attorneys from EPA and NHTSA; NHTSA's former Administrator; and NHTSA's former Chief Counsel. We also discussed with EPA officials the environmental implications of delaying implementation of an onboard regulation and how the delay would affect the benefits associated with onboard systems.

We discussed with EPA and NHTSA officials how other Clean Air Act Amendments requirements that may involve NHTSA, such as the use of alternative fuels, could raise somewhat similar safety concerns. We also interviewed a California Air Resources Board official and a representative from the Center for Auto Safety for their views on the safe use of alternative fuels.

We conducted our work between September 1990 and April 1991 in accordance with generally accepted government auditing standards. We discussed the factual information in this report with EPA and NHTSA officials and the officials generally agreed with the facts presented. Their comments are incorporated where appropriate. However, as requested, we did not obtain written agency comments on a draft of this report.

Action Plan Needed to Resolve Onboard Safety Issue

Since 1987 EPA has been attempting to require that passenger vehicles be equipped with onboard systems to control refueling vapors. However, concerns raised by NHTSA about the safety of onboard systems prevented EPA from promulgating the regulation requiring these systems. Recognizing the need to control ozone levels and to ensure that EPA and NHTSA address safety concerns, the Congress required (1) that EPA and NHTSA consult on the safety of onboard systems and (2) that EPA issue a final regulation requiring onboard systems by November 1991.

Although EPA and NHTSA officials have been consulting about the safety of onboard systems, EPA and NHTSA remain far from resolving the onboard safety issue. Without resolution of this issue, the implementation of onboard systems in model year 1996 could be delayed. Developing a joint approach, or action plan, to address onboard safety concerns could assist EPA and NHTSA in resolving this long-standing dilemma. Such an approach could also serve as a framework for resolving future differences over the safety and environmental benefit of pending alternative fuels regulations.

Safety of Onboard Systems Is a Long-Standing Issue

Since EPA first proposed a regulation requiring onboard systems 4 years ago, EPA and NHTSA have been unable to agree on whether these systems will be safe. EPA believes onboard systems will be safe and pose no additional risk to the motorist. NHTSA maintains that the systems could compromise motor vehicle safety by increasing the risk of fuel spillage and fires.

EPA has anticipated that onboard systems would be simple in design—essentially an extension of current evaporative emission control systems. Evaporative systems have been installed on motor vehicles since 1971. EPA officials in the Office of Mobile Sources cite provisions in the Clean Air Act Amendments of 1990 that require vehicles to be equipped with enhanced evaporative systems. The officials believe these systems will incorporate many of the same components, such as larger canisters and larger vapor lines, as onboard systems.

EPA contracted with Battelle, a safety consulting firm, to compare the safety of onboard systems with that of evaporative systems. The study concluded that the safety risk posed by onboard systems was in fact no different from the risk posed by evaporative systems. EPA believes that there has been a small number of serious injuries resulting from evaporative systems and that this proves that they are safe. According to EPA, NHTSA's Vehicle Owner Safety Complaint data base shows that between

1977 and 1988 fewer than 10 complaints reported involving fire have been directly linked to evaporative emission systems.

NHTSA disagrees with EPA's position that onboard systems would be a simple extension of evaporative systems. According to NHTSA, onboard systems would have to capture larger volumes of fuel vapor in a shorter span of time than evaporative systems. Manufacturers said they would have to modify existing fuel systems—making them more complex—to accommodate onboard systems. EPA estimates that onboard canisters will be three times larger than the current 1-liter evaporative canisters. This, according to automobile manufacturers, will require major redesign of existing fuel systems for some vehicle models.

NHTSA is concerned that the larger 3-liter canisters and larger vapor lines needed for onboard systems may be more susceptible to damage in the event of an accident, posing a greater risk of fuel-related incidents such as leakage and crash fires. NHTSA has also expressed concerns that onboard systems could lead to increased pressure in the fuel tank, fuel spitback during refueling,[1] and gasoline vapor leakage from the canister. According to NHTSA, these conditions could increase the risk of non-crash vehicle fires and compromise passenger safety.

A NHTSA official said he believes that EPA's figure of fewer than 10 consumer complaints about fires linked to evaporative emission systems underestimates the problem. The official says NHTSA has received hundreds of complaints from vehicle owners that may be related to evaporative systems. According to the official, very few owners are able to pinpoint the equipment that causes the complaints. Rather, most owners complain about symptoms like gasoline spurting from the fill-pipe. As a result, the official is not surprised that EPA identified fewer than 10 complaints involving fire that were directly linked to evaporative systems.

EPA believed that NHTSA's concerns about onboard safety could easily be addressed through onboard system design modifications. EPA did, however, attempt to address NHTSA's concerns. In early 1988 EPA built an onboard system integrating evaporative and onboard hardware into one design. EPA claimed that its new system addressed NHTSA's concerns regarding fuel system complexity and safety. NHTSA disagreed with EPA about the safety of the new design and questioned whether the modified

[1]Under certain conditions, high ambient temperatures can cause gasoline in the fuel tank to boil, increasing fuel tank pressure. High fuel tank pressure can force liquid fuel out of the gasoline tank's fill-pipe when the gas cap is removed.

onboard design could reduce the functional complexity of onboard systems.

To demonstrate the system's feasibility and safety, the American Petroleum Institute, which supported the implementation of onboard systems in preference to the use of Stage II controls, provided NHTSA with a test-drive vehicle. On the basis of the test, NHTSA noted significant new safety problems related to driveability that added to the agency's concerns about fuel system complexity. NHTSA officials reported problems with vehicle stalling and refueling, noting several instances of fuel spurting from the gas tank. According to an EPA senior project manager, the incident worked to further delay resolution of the onboard safety issue.

Because of the safety concerns it believes are associated with onboard systems, NHTSA's position is that gasoline-station-based— or Stage II—technology is the better alternative for controlling refueling emissions. Because Stage II controls have been in use since the early 1970s with few reported safety problems, NHTSA considers the technology proven.

EPA, however, envisions Stage II as an interim step that the nonattainment areas—those that exceed the national ambient air quality standard for ozone—can take while awaiting onboard systems. EPA's position is similar to the 1990 amendments' requirement, which state that Stage II programs will be phased out as onboard systems are phased in. Unlike Stage II controls, onboard systems provide comprehensive, nationwide control of refueling vapors because use of these systems would not be limited to nonattainment areas. EPA also believes that an onboard regulation would be easier to enforce than a Stage II program. Enforcement of onboard system requirements would be limited to several automobile manufacturers, while enforcement of Stage II controls would involve thousands of gasoline stations nationwide.

Recent Attempts to Resolve Onboard Controversy Unsuccessful

Recognizing the need to control ozone levels, the Congress, in the Clean Air Act Amendments of 1990, directed EPA to issue a regulation for onboard systems within 1 year from the date of the enactment, or by November 1991. Under section 202 (a)(4) of the Clean Air Act, EPA cannot require a vehicle component or element of design that causes or contributes to an unreasonable risk to public safety. To ensure that the issue of onboard safety is adequately addressed before automakers

begin complying with the onboard regulation 4 years after the regulation is issued, the Congress directed EPA to consult with NHTSA on the safety of onboard systems.

Since passage of the 1990 amendments, EPA and NHTSA have met to discuss plans to resolve the onboard safety concerns. As of June 1991, or 5 months prior to the November 1991 deadline, the two agencies are far from agreeing on NHTSA's concerns about the safety of onboard systems. EPA and NHTSA have not developed a planned approach, or action plan, for addressing the safety issue. Central to this approach is NHTSA's belief that it needs manufacturer-produced vehicles equipped with onboard systems to facilitate a safety evaluation.

Lack of a Planned Approach Delays Resolution of Onboard Safety Issue

The lack of agreement between EPA and NHTSA on a planned approach has delayed resolution of the safety issue. According to a representative from Battelle, the approach of having one agency do its own analysis and expect the other agency to accept the results was the old approach, and it clearly did not work. For example, during the 4-year impasse, both EPA and NHTSA contracted with private consulting firms to address the onboard safety issue. However, because the two agencies did not agree on what the studies should accomplish,[2] the findings of both studies were subsequently challenged by the other agency. As a result, neither study helped to resolve the safety impasse. EPA and NHTSA officials have not moved past this old approach. Therefore, efforts to resolve the safety concerns have been and continue to be unsuccessful.

Relying on the past approach has resulted in no agreement on the data and analysis needed to resolve the safety issue. After EPA and NHTSA met in January 1991 to discuss plans to address onboard safety, EPA anticipated that NHTSA would document information to demonstrate its safety concerns with data that could be used by EPA to determine if onboard systems pose an unreasonable safety risk. However, in February 1991 NHTSA provided EPA with a brief statement that reiterated its earlier position on onboard safety without any additional supporting analysis. In the letter, NHTSA stated: "...we continue to be apprehensive about the safety of onboard systems." In a subsequent May 1991 response to NHTSA, EPA characterized NHTSA's comments as inadequate. EPA said that,

[2]In addition to the Battelle study sponsored by EPA, NHTSA contracted with Arthur D. Little, Inc. in 1989 to assess the safety risk associated with onboard systems.

without a definitive finding from NHTSA on the safety of onboard systems, it would have to promulgate an onboard regulation by the legislative deadline. However, NHTSA has not provided such a finding to EPA.

NHTSA officials told us that EPA's expectation for a definitive NHTSA finding on the safety of onboard systems is unrealistic because onboard systems are not available to be tested. The officials said that, by testing manufacturers' onboard systems prior to sale, NHTSA could identify design or manufacturing flaws related to safety. According to NHTSA, for testing to be meaningful, NHTSA will need to test manufacturers' onboard-equipped vehicles that meet the Clean Air Act's new emission standards. The 1990 amendments require vehicles to meet more stringent tailpipe emission standards beginning in 1994. NHTSA is concerned that more stringent tailpipe emission standards could exacerbate potential safety problems with onboard systems, according to NHTSA's Director of the Office of Defects Investigation.

When EPA and NHTSA met in January 1991 to consult on the safety issue, a clear agreement on approach could have prevented misunderstanding about the data to be provided. Such an approach could, at a minimum, include (1) which systems to test and what testing method to use, (2) test procedures, (3) time frames for conducting the tests, and (4) criteria for evaluating the test results. A Battelle spokesman, in discussing the approach needed to assess onboard safety, said, for example, that one of the most important factors in a testing program will be EPA and NHTSA agreement from the beginning on the criteria that will be used. These criteria include the level of acceptable temperature and pressure buildup, whether vapor leakage occurs, and impacts onboard systems have on vehicle stalling. An OMB official also believes that testing onboard-equipped vehicles prior to sale could help resolve the safety issue. He cautioned, however, that EPA and NHTSA should provide automobile manufacturers with sufficient lead time to make any necessary modifications to the onboard systems.

Automakers' representatives we spoke with agreed that a planned approach could help resolve the onboard safety issue. These representatives believe that if EPA and NHTSA had initially worked together to develop such a plan, the safety debate could have been resolved earlier. NHTSA's former Administrator, who headed the agency when the onboard controversy began, agreed that an action plan could have been useful for resolving the onboard safety issue.

NHTSA Needs Manufacturers' Hardware to Assess Onboard Safety

Because NHTSA is the agency responsible for ensuring motor vehicle safety, NHTSA officials have the knowledge and expertise to address onboard safety concerns. According to EPA officials we spoke with, including the Director of EPA's Office of Mobile Sources, NHTSA should be responsible for addressing the safety of onboard systems. Although NHTSA officials we spoke with agreed that the agency is in the best position to address onboard safety, they emphasized that EPA will have to determine if the risk associated with onboard systems, once identified, is worth the environmental benefit of reducing hydrocarbons.

However, according to NHTSA's Chief Counsel, the agency has been reluctant to make a definitive statement about onboard safety risk before the systems are installed and are in widespread use on manufacturer-produced vehicles. Rather, NHTSA typically issues regulations for known conditions that affect motor vehicle safety. For example, NHTSA issued a regulation requiring that passenger vehicles be equipped with automatic restraints such as air bags. The agency could quantify the benefits and risks associated with air bags on the basis of accident data. Although willing to comment on the safety of onboard systems, NHTSA believes it cannot fully assess or quantify the safety risk of onboard systems until it has performance data from consumer experiences in driving vehicles with onboard systems.

In October 1990, when it became clear that an onboard provision would be included in the 1990 amendments, NHTSA surveyed eight automakers to determine the status of their onboard technology and the availability of onboard-equipped vehicles that met the new emission requirements. Seven of the eight manufacturers responded to the survey; each reported that onboard-equipped vehicles capable of meeting new tailpipe emission standards were not currently available. All of the manufacturers reported that they had onboard systems in the early stages of development. Automobile manufacturers, however, said they needed an onboard regulation to set design criteria and test procedures to complete onboard development efforts. The manufacturers indicated a willingness to work with NHTSA in providing vehicles and facilities for testing, but they generally agreed that it was too early in the development of onboard technology to conduct such testing.

Implications of Not Resolving Onboard Safety Issue

If EPA and NHTSA do not address the onboard safety issue, implementation of the onboard systems could be delayed beyond model year 1996. To ensure that this situation does not occur, a safety evaluation needs to be performed prior to the manufacturers' sale of vehicles with onboard systems. If onboard systems are delayed, the hydrocarbon decreases expected as an environmental benefit would begin to occur at a later date. In nonattainment areas, however, hydrocarbons from refueling emissions will be lowered as soon as Stage II controls are installed at the gas pumps.

On the other hand, automakers are concerned that if the safety issue is not resolved before manufacturers have to comply with the onboard regulation, and if NHTSA's safety concerns are realized, vehicle safety could be compromised, increasing the risk of injury to motorists. Automakers are concerned that this could expose them to an increase in product liability litigation. According to the automakers' representatives we spoke with, product liability cases are always a concern because they bring negative publicity and high legal expenses. Even in those cases when motorists are clearly at fault, plaintiff attorneys seek to demonstrate manufacturer negligence. Industry officials believe that onboard systems, because of unresolved safety concerns, will encourage litigation without regard to actual negligence on the part of the manufacturer.

Resolving the onboard safety issue could also provide a framework for EPA and NHTSA to address future environmental regulations concerned with vehicle safety. Many representatives we spoke with, including those from industry and private interest groups, thought that the case of onboard systems was only one example of regulations affecting safety and the environment that could result in a debate between EPA and NHTSA. The alternative fuels the federal government will promote over the next several years could pose safety problems similar to those generated by the case of onboard systems. For example, methanol, which is an alternative fuel, corrodes metal and could damage emission system components, increasing the incidence of fuel spillage and fires in motor vehicles.

Moreover, according to the Director of NHTSA's Office of Defects Investigation, the combination of various fuel types in the vehicle gasoline tank poses serious safety concerns. For example, certain fuel mixtures will have volatility levels higher than the allowable levels for gasoline. As fuel volatility increases, so too does the propensity for the fuel to evaporate. More fuel evaporation will also produce larger volumes of vapor

for onboard canisters to capture. Over a period of time, the excess vapors can reduce the effectiveness of an onboard system by saturating the canister. In addition, a 1988 study by the Center for Auto Safety found a direct relationship between high fuel volatility and vehicle crash fires. This is another area where close cooperation and coordination between EPA and NHTSA will be needed to resolve questions concerning the risks of alternative fuels.

Conclusions

EPA and NHTSA do not agree on the safety of onboard systems to control refueling emissions. EPA believes manufacturers can build safe systems; NHTSA has raised a number of concerns about how safe these systems may be. After more than 4 years of discussion and study, EPA and NHTSA have not resolved these differences. NHTSA's most recent position is that automobile manufacturers have not yet developed and produced suitable prototypes to test for safety risks.

Since EPA has been consulting with NHTSA about the safety of onboard systems, and assuming no change in EPA's view that onboard systems do not pose an unreasonable risk, EPA is required by the Clean Air Act Amendments of 1990 to issue a regulation by November 1991. One result of such an onboard regulation would be the development of manufacturer-produced systems that could be made available to EPA and NHTSA to facilitate a safety evaluation of manufacturers' onboard systems to identify and correct any safety defects or manufacturing flaws. This effort should be made well in advance of the 1996 model year to ensure that an orderly phase-in occurs. To do so EPA and NHTSA need to develop an approach, or action plan, to spell out how they will address the onboard safety issue. This approach, or action plan, should, at a minimum, identify each agency's roles and responsibilities, the test data and analysis to address the safety concerns, and the time frames for completing this analysis.

As we look to the future, the multitude of environmental and safety regulations that will be required over the next 10 years will cause regulators to further consider environmental benefits and safety needs. For example, the use of alternative fuels in motor vehicles could pose related or somewhat similar questions as those that need to be addressed for onboard systems. A joint approach developed to address the safety concerns with onboard systems could be used as a framework for resolving future differences between the two agencies on safety issues.

Recommendations

GAO recommends that the Administrator of EPA go forward with the onboard regulation by November 1991 as required by the Clean Air Act Amendments of 1990 unless EPA determines that onboard systems pose an unreasonable risk to public safety. GAO also recommends that the Administrator of EPA, and that the Secretary of Transportation direct the Administrator of NHTSA to, develop a joint approach, or action plan, to perform a safety evaluation of manufacturers' onboard systems to identify and correct any safety defects or flaws well in advance of the 1996 model year so that an orderly phase-in occurs. As part of the plan, GAO recommends that EPA and NHTSA work with the automobile industry during the 4 years between promulgation of the regulation and the phase-in of onboard systems called for by model year 1996. At a minimum, this plan should identify the roles and responsibilities of each agency, the safety tests and analysis to be performed, what the analysis will accomplish, and the time frames for performing the analysis.

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