federal register

Wednesday
April 15, 1992

Part III

Environmental Protection Agency

40 CFR Parts 80, 86, and 600

Control of Air Pollution From New Motor Vehicles and New Motor Vehicle Engines; Refueling Emission Regulations for Gasoline-Fueled Light-Duty Vehicles and Trucks and Heavy-Duty Vehicles; Proposed Rule

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 80, 86, and 600

[AMS-FRL-4120-1]

RIN 2060-AC04

Control of Air Pollution From New Motor Vehicles and New Motor Vehicle Engines; Refueling Emission Regulations for Gasoline-Fueled Light-Duty Vehicles and Trucks and Heavy-Duty Vehicles

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final agency action pursuant to section 202(a)(6) of the Clean Air Act regarding onboard control of refueling emissions.

SUMMARY: On August 19, 1987 (52 FR 31162), EPA published a proposal to require vehicle-based (onboard) control of refueling emissions from gasoline-powered light-duty vehicles, light-duty trucks, and heavy-duty vehicles. This notice announces EPA's decision not to promulgate onboard control requirements at this time and explains the rationale for that decision.

ADDRESSES: Materials relevant to this action are contained in public dockets A-87-11 and A-84-07, located in the Air Docket of the U.S. Environmental Protection Agency, 401 M St., SW., Washington, DC and are available for review in room M-1500 between the hours of 8:30 a.m. to 12 p.m. and 1:30 p.m. to 3:30 p.m. on weekdays. As provided in 40 CFR part 2, a reasonable fee may be charged for copying.

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SUPPLEMENTARY INFORMATION

I. Background

For over 15 years, the control of vehicle refueling emissions has been the subject of a complex debate. Two technologies exist to control these emissions: Onboard (vehicle-based controls) and Stage II (controls at the dispensing pump). Each approach has certain advantages and disadvantages, but if implemented properly, either would be effective at controlling refueling emissions.

Section 202(a)(6) of the 1977 Clean Air Act (CAA) Amendments directed EPA to study the relative merits of the two control strategies for refueling emissions. If, based on the study, EPA found onboard vapor recovery feasible and desirable, it was to prescribe standards requiring the use of such technology after consulting with the Secretary of Transportation with respect to motor vehicle safety. EPA began the study of onboard and Stage II controls in 1983, and in 1984 released a draft gasoline marketing study for public comment (49 FR 31706, August 8, 1984) (see public docket A-84-07). In the same time frame, EPA also initiated consultation with the Department of Transportation (DOT) (through the National Highway Traffic Safety Administration (NHTSA)) regarding onboard safety. In these discussions, NHTSA expressed concern that the implementation of onboard canister systems would cause an unquantifiable increase in the risk of crash and non-crash vehicle fires. Docket Number II-D-05 and -10. Entries of this nature throughout this document indicate where such material can be found in public docket A-87-11.

Following review of the comments on EPA's draft gasoline marketing study, EPA concluded that the control of vehicle refueling emissions was appropriate and that onboard controls were feasible and desirable, and a rulemaking was begun. As part of the proposed rulemaking analysis, EPA prepared a technical report assessing NHTSA's concerns. (II-A-17) In August, 1987, EPA published a proposal to require onboard canister systems for gasoline-powered motor vehicles, seeking comment on concerns raised regarding vehicle safety issues (52 FR 31162, August 19, 1987).

Following publication of the proposal, EPA received public comment reflecting both sides of the safety issue. Auto industry interests and several safety organizations expressed concerns similar to NHTSA's, while gasoline marketing interests and other safety and environmental groups thought such concerns were not significant. After the comment period closed, discussion between EPA and NHTSA continued, as technical staff attempted to resolve their differences.

As the consultation continued, Congress began debate in earnest about revisions to the CAA. As it became clear that the amendments would address the control of refueling emissions, EPA postponed making any final decisions pending the new legislation.

The CAA Amendments of 1990 contain provisions addressing both Stage II and onboard. As is discussed more fully below, sections 182(b)(3), (c), (d) and (e) require Stage II in moderate, serious, severe, and extreme ozone nonattainment (NA) areas. Under section 182(b)(3) and 184(b)(2) State II might also be implemented in marginal ozone NA areas and attainment areas in the Northeast U.S. section 202(a)(6) requires action on onboard controls:

(6) ONBOARD VAPOR RECOVERY.—Within 1 year after the date of enactment of the Clean Air Act Amendments of 1990, the Administrator shall, after consultation with the Secretary of Transportation regarding the safety of vehicle-based ("onboard") systems for the control of vehicle refueling emissions, promulgate standards under this section requiring that new light-duty vehicles manufactured beginning in the fourth model year after the model year in which the standards are promulgated and thereafter shall be equipped with such systems. The standards required under this paragraph shall apply to a percentage of each manufacturer's fleet of new light-duty vehicles beginning with the fourth model year after the model year in which the standards are promulgated. The percentage shall be as specified in the following table:

IMPLEMENTATION SCHEDULE FOR ONBOARD VAPOR RECOVERY REQUIREMENTS

Model year commencing after standards promulgated	Percentage [1]
Fourth	40
Fifth	80
After Fifth	100

[1] Percentages in the table refer to a percentage of the manufacturer's sales volume.

The standards shall require that such systems provide a minimum evaporative emission capture efficiency of 95 percent. The requirements of section 182(b)(3) (relating to Stage II gasoline vapor recovery) for areas classified under section 181 as moderate for ozone shall not apply after promulgation of such standards and the Administrator may, by rule, revise or waive the application of the requirements of such section 182(b)(3) for areas classified under section 181 as Serious, Severe, or Extreme for ozone, as appropriate, after such time as the Administrator determines that onboard emissions control systems required under this paragraph are in widespread use throughout the motor vehicle fleet.

II. Outcome of Consultation With DOT

As directed by the CAA Amendments of 1990, EPA has consulted with DOT regarding the safety of vehicle-based (onboard) canister systems for the control of refueling emissions. During the first half of 1991, several meetings and discussions were held between EPA and NHTSA officials regarding the consultation process, and correspondence was exchanged regarding both the consultation process and technical matters related to onboard safety. (IV-B-20; IV-C-170, 171, 172; IV-D-689, 691, 698, 699, 749; IV-H-06, 07) As part of that process, in August 1991 NHTSA released an updated report on onboard safety entitled "An Assessment of the Safety of Onboard Refueling Vapor Recovery Systems". (IV-D-701) As stated in the report's Executive Summary, the purpose of the report was "to establish NHTSA's consultation position concerning onboard safety, in accordance with statutory direction, to be used by EPA in its rulemaking deliberations concerning ORVR [onboard system] safety." The principal conclusion of the NHTSA report is that onboard canister systems—the only onboard system design beyond the most preliminary stages of development and, therefore, the only design capable of being evaluated in the report—will result in an increase in safety risk and thus have a negative impact on safety.

In response to the release of NHTSA's report, EPA published a **Federal Register** notice (56 FR 43682, September 3, 1991) announcing the availability of the report and seeking comment on the content and findings of the NHTSA study. A public hearing was held on September 26 and 27, 1991, and NHTSA officials participated on the hearing panel. Sixteen parties provided oral testimony at the public hearing and over 30 written comments were received. Copies of all of these materials are also available in the docket.

On October 31, 1991, based on NHTSA's review of the presentations made at the public hearing and submissions made to the public docket, the NHTSA Administrator sent EPA a letter stating that the conclusions of its July 1991 report were unchanged. (IV-H-08) In a November 8, 1991 letter, EPA asked NHTSA to provide specific responses to comments on the NHTSA report and to provide the technical basis for the statement that the comments received on the report had not changed NHTSA's views regarding onboard canister system safety. (IV-H-9) NHTSA replied in a November 27, 1991 letter to EPA which included a technical evaluation of, and response to, the comments on the NHTSA report. (IV-H-10) The technical evaluation reaffirmed the conclusions expressed in NHTSA's report and in the NHTSA Administrator's October 31, 1991 letter.

The NHTSA report contained several conclusions. As mentioned above, the principal conclusion of the report is that onboard systems will result in an increase in safety risk and thus have a negative impact on vehicle safety. This conclusion is based on three supporting conclusions. First, canister-based onboard systems would be more complex in design and operation than current evaporative systems (i.e. canister systems currently used to capture evaporative emissions (not refueling emissions)), and this greater complexity would lead to greater risk. Second, canister-based onboard systems would entail the handling and storage of greater amounts of flammable vapor on the vehicle, leading to greater crash and non-crash fire risks. Third, NHTSA's analysis of its data indicates that vehicle fire risks would increase with onboard canister-based systems. NHTSA did not quantify the increase in risk, but concluded that some risk was inherent in canister-based onboard technology and noted that Stage II technology does not present this concern.

Concerns regarding design and operating complexity and increased safety risk were supported by a number of findings in the NHTSA report:

—As compared to current and future evaporative systems, the increase in the number of parts and connections with canister-based onboard systems will make canister-based onboard systems more vulnerable to failure in collisions and in normal use.

—Some onboard system components, such as filler pipe nozzle sealing devices and vapor vent valves, will need to be placed in areas of potential collision damage, adding to the likelihood of fuel and vapor release in collisions.

—As compared to current and future systems, many onboard system components will be larger and therefore more difficult to locate in areas less likely to sustain damage in collisions.

—The larger onboard system components, particularly during operation in high ambient temperatures, will carry much larger inventories of fuel vapor than current evaporative systems, increasing the likelihood of fires if a release of this vapor should occur in the presence of an ignition source.

Concern that vehicle fire risks would increase with onboard canister systems was also supported by several findings:

—During the refueling process, vapor flow from the fuel tank to an onboard system canister for vapor storage can be 45 to 65 grams per minute. This is much greater than current evaporative flow rates, which rarely exceed 6 to 8 grams per minute and are generally less than 1 gram per minute. The flow is also greater than that contemplated by the type of enhanced evaporative controls being considered under section 202(k) of the CAA. Should this vapor escape, due to a design or manufacturing error, improper maintenance, or tampering, uncontrolled vapor would flow into the engine compartment or under the vehicle and ignite, should an ignition source be present.

—NHTSAlaboratory tests simulating a failed refueling vapor vent hose indicated that vapor flowing through this hose, if exposed to ignition sources characteristic of the motor vehicle environment, would ignite and result in a sustained flame.

—High vapor flow during vehicle refueling will result in a significant increase in the fuel vapor stored onboard the vehicles in canisters, compared to existing vehicles.

—Full scale laboratory vehicle crash tests indicate that even current evaporative canisters can lose their integrity in crashes and expose the charcoal/vapor contents of the canister to possible ignition sources. NHTSA test simulating a canister broken due to collision forces indicated that the vapor in canisters, if exposed to ignition sources characteristic of the motor vehicle environment, would ignite and result in significant, self-sustaining fires.

Finally, it is worth noting one other finding of the NHTSA report regarding the status of onboard technology:

—There are no onboard prototype systems that function satisfactorily under all vehicle operating conditions and that meet current evaporative and tailpipe emission requirements. Further, there are no onboard prototypes that can meet the more stringent tailpipe and enhanced evaporative emissions requirements of the 1990 Clean Air Act Amendments.

In addition to this principal conclusion and the supporting findings, NHTSA notes that, according to EPA and other studies, Stage II vapor control systems are an effective existing technology which presents no incremental risk and are thus a viable alternative to onboard controls. NHTSA then concludes that EPA should consider the risk differences of onboard and Stage II in the regulatory decision concerning onboard controls, and that it would be reasonable for EPA to conclude that onboard systems constitute an unreasonable safety risk.

III. EPA's Discretion To Determine Whether to Require Canister-Based Onboard Controls

1. Whether EPA Has Discretion Not To Issue an Onboard Requirement

Before discussing EPA's evaluation of and response to NHTSA's report and related documents, an initial question is whether EPA has discretion not to require onboard controls, in light of the results of the consultation process. The Agency believes it apparent from the statutory text and structure, as well as from the legislative history to section 202(a)(6), that EPA retains discretion not to require onboard controls due to concerns regarding their safety. The words of command together with the deadline found in section 202(a)(6) establish a mandatory duty for the Agency to take action regarding onboard controls by the specified dates. The consultation requirement in section 202(a)(6), however, leaves the statute ambiguous about what action EPA may take in light of that process. Congress would not have mandated imposition of onboard controls if the Department of Transportation and EPA find, after consultation, that these systems pose unreasonable safety risks. To have meaning, the consultation requirement must allow EPA to decline to impose requirements based on the results of the consultation process.

EPA also rejects the contention that any safety concerns with onboard control systems noted in the consultation process should only be redressed during the vehicle certification process pursuant to section 206(a)(3)(A). This would mean, potentially, that automakers would be required to comply with a requirement to install a device that they would be subsequently prohibited from using. The Agency does not believe that Congress intended to mandate this irrational result. Moreover, as discussed below, the legislative history to section 202(a)(6) states that Congress intended EPA to resolve the issue of onboard control system safety in this rulemaking.

A second statutory indication that EPA is not mandated to issue a rule requiring onboard controls occurs in the portion of section 202(a)(6) describing Stage II controls, in which Congress recognized the possibility that onboard requirements would not be promulgated. Section 202(a)(6) provides that only after EPA issues an onboard requirement would states be relieved of the requirement (in section 182(b)(3)) that Stage II controls be installed in moderate ozone nonattainment areas. If the imposition of onboard requirements were mandatory, however, this language (indeed, the section 182(b)(3) requirements themselves) would be unnecessary. Moreover, if EPA had a mandatory duty to issue onboard controls as of November, 1991, then it would make little sense for Congress to have required states to submit State Implementation Plan revisions by November, 1992, requiring Stage II controls in ozone moderate nonattainment areas.

The legislative history to section 202(a)(6) confirms that EPA retains discretion not to require onboard controls based on the consultation process with DOT. The House Report states:

> Paragraph 202(a)(6) directs the Administrator, in consultation with the Secretary of Transportation, to determine that onboard vapor recovery systems are safe. It is expected that this determination will be made before the promulgation of the regulations under this paragraph. The determination is an independent duty and shall not affect the Administrator's mandatory duty to promulgate regulations, subject to paragraph 202(a)(4), which provides that emission controls may not cause an unreasonable risk to safety.
>
> Refueling emissions control has been a contentious issue for many years. This provision will resolve the safety issue * * *.
>
> The Committee wants onboard controls that are effective and safe. No one wants a rule that requires controls for the consumer that present safety problems. These problems need to be resolved in the rulemaking under section 202(a)(6). The bill provides the mechanism for this to occur. It should. H. Rep. No. 490, 101st Cong. 2d Sess. at 303, 304.

Since section 202(a)(6) is based on the House bill (Cong. Rec. of Oct. 27, 1990, at S 16935), the House Report is a principal source of legislative history for the provision.

The legislative language to which the House Report refers, however, is somewhat different from that eventually enacted. The House bill included the consultation requirement in a separate sentence following the initial sentence directing the Agency to issue an onboard requirement. That separate sentence provided that "[t]he Administrator shall determine, in consultation with the Secretary of Transportation, that such systems are safe." (Cong. Rec. of May 23, 1990 at H 2798). This separation of the promulgation requirement from the consultation requirement may explain the statement in the legislative history that the safety determination "shall not affect the Administrator's mandatory duty to promulgate" the onboard requirement. See also fn.[1] *infra.* The provision as enacted by Congress, however, does not explicitly require the Administrator to determine that onboard systems are safe, and instead provides for the determination to be made as part of the rulemaking requirement process. This linking of the safety determination with the rulemaking is more in keeping with Congress' intent as expressed in the rest of the House Report—that "[n]o one wants a rule that requires controls for the consumer that present safety problems. These problems need to be resolved in the rulemaking under section 202(a)(6)." Indeed, a summary of the Clean Air Act conference agreement submitted by Senator Baucus as an aid to the floor debates on that agreement states explicitly:

> Auto manufacturers are required to install canisters on vehicles to capture hydrocarbons that would otherwise be emitted * * * during refueling * * * if these devices are determined to be safe by the EPA and the Department of Transportation. Cong. Rec. of Oct. 24, 1990 at S 18038.

Senator Baucus, as chairman of the Senate Subcommittee on Environmental Protection at the time the CAA Amendments of 1990 were being drafted, had a leading role in the development of the conference agreement and his summary may thus be considered authoritative. Clearly, the legislative history evinces a Congressional intent to leave EPA with the discretion not to require onboard controls based on the outcome of consultation process with DOT.

2. The Standard That Should Apply to EPA's Exercise of Discretion

EPA concludes that it has discretion not to require onboard controls based on the safety consultation with DOT. The standard by which this discretion should be exercised remains to be determined. Here again, the statute and legislative history provide assistance. Section 202(a)(4), a provision referred to in the legislative history of section 202(a)(6) (see H. Rep. No. 490 at 303, quoted above), provides that "no emission control device * * * shall be used in a new motor vehicle * * * for purposes of complying with requirements prescribed under this title if such device * * * will cause or contribute to an unreasonable risk to public * * * safety in its operation or function." In determining what constitutes an unreasonable risk, EPA is to consider "the availability of other devices * * * which may be used to conform to requirements prescribed under this title without causing or contributing to such unreasonable risk" (section 202(a)(4)(B)(iii)).

At the least, the general goals and principles of section 202(a)(4) can be considered in deciding whether to promulgate an onboard canister-based requirement.[1] Thus, the Agency will first

[1] Section 202(a)(4) by its own terms applies to use of emission control devices, rather than to promulgation of standards requiring such devices, Continued

examine (guided by the DOT recommendation as to safety) if canister-based onboard controls pose a safety risk, ascertain to the extent possible the extent of the risk, and determine if the risk is unreasonable based in large part on the availability and safety of comparably effective refueling control measures, namely Stage II controls.

IV. EPA Findings and Conclusions

A. Response to Conclusions of the Consultation

A review of the record for this proposal (public docket A-87-11) shows a lengthy and detailed consultation process between EPA and DOT regarding the potential safety implications of canister-based onboard systems. The process began in March of 1986, more than a year before publication of the proposal, and has continued to varying degrees over the past six years. The consultation has occurred through a number of means. EPA and DOT management and technical staff held meetings and exchanged correspondence on issues related to onboard system safety. The agencies exchanged technical information on the fuel vapor control system safety of current vehicles and the emission performance requirements for future vehicles. Both agencies have prepared or commissioned numerous technical reports and similar documents raising or assessing various aspects of the onboard system safety issue. EPA also developed and tested a prototype onboard system which was installed on a vehicle and evaluated by NHTSA. (IV-A-06; IV-E-93,94)

NHTSA's July 1991 report and its response to the oral and written comments thereto mark the last (and culminating) phase of the consultation process. EPA has been heavily involved in assessing the technical aspects of onboard safety over the course of this consultation. However, since NHTSA is the Federal agency charged with ensuring motor vehicle safety, NHTSA's findings on safety issues are entitled to special consideration. NHTSA, in its report and related correspondence, including the technical evaluation of comments, has concluded that onboard canister systems will unavoidably increase vehicle safety risk and has recommended that EPA forgo requirements for canister-based onboard controls and instead proceed with Stage II for the control of refueling emissions.

The Agency has reviewed the NHTSA report, including the comments (both written and oral) to it and NHTSA's response to those comments. EPA's review of the rulemaking record indicates that NHTSA has persuasively responded to all of the significant comments made regarding the safety issue. In light of NHTSA's safety expertise and EPA's review of the NHTSA response, EPA adopts NHTSA's response for purposes of addressing those comments in this rulemaking.

After carefully reviewing the comments and the record, the Agency believes that NHTSA's conclusions and supporting analyses are reasonable. NHTSA's analysis shows that canister-based onboard systems are potentially subject to additional failure modes compared to current systems, or enhanced evaporative systems under 202(k), due to added size and components and increased rate of vapor flow during refueling. Further, NHTSA's analysis shows that onboard canisters must necessarily result in vehicles handling, storing, and transporting increased amounts of gasoline vapor which in turn increases the risk of vehicle fires and the seriousness of such fires. Also NHTSA's report includes crash studies and analyses which indicate the potential for self-sustaining vehicle fires to result if canisters are damaged by collision. For many of these same reasons, NHTSA's conclusion that increased safety risk is inherent to canister-based onboard systems appears reasonable. Again, in light of NHTSA's safety expertise and EPA's review of the record, EPA adopts NHTSA's conclusions and supporting analyses that canister-based onboard systems will increase the risk of vehicle fires.

Given the absence of experience with onboard canisters in a large number of vehicles in real world operation, and the availability of the Stage II alternative, NHTSA did not quantify the increased safety risk posed by onboard canister systems. Nor has EPA. However, any vehicle condition posing a potential increase in risk of vehicle fires must be viewed seriously, because of the increased risk of fire and of harm whenever vehicle fires occur. NHTSA consequently was of the view that onboard canister controls posed an unreasonable risk given that an alternative emission control system exists, namely Stage II, that does not present any of these risks. In the case of this decision, EPA agrees that this is the relevant inquiry. Thus, in the following sections, EPA discusses the potential safety risks associated with Stage II controls, the degree to which Stage II controls provide refueling emission reductions comparable to onboard canister control systems, and the relative costs of the two systems.

B. Stage II Safety and Effectiveness

1. Stage II Safety

Stage II control systems were first installed in the mid-1970's in California. Since that time they have undergone a number of developmental generations in which improvements have been incorporated. Although some operational difficulties were encountered in the very early years of the use of this technology, leading to limited safety concerns, such problems have been notably absent in the more recent generations of this equipment produced over the past 5-10 years. Contacts with local fire marshals and review of national statistics on service station fires such as those provided by the National Fire Incident Reporting System indicate no evidence of greater risk with Stage II dispensing equipment than with conventional dispensing equipment. (IV-H-04) Stage II nozzles incorporate several features designed to address potential safety problems (e.g., secondary liquid shut off, emergency breakaway, and liquid removal systems). Also under California Air Resources Board procedures recommended by EPA in recent Stage II guidance documents, the State fire marshall must preapprove and certify all Stage II equipment designs. (IV-A-8) Comments in the record indicate that Stage II dispensing equipment is at least as safe as conventional dispensing equipment, and suggest that the addition of Stage II controls would marginally reduce the annual rate of service station fires due to control of refueling vapors. (IV-D-725)

2. Comparison of Refueling Emission Control Effectiveness

The second point to be addressed is how a decision not to implement onboard controls would impact the overall control of refueling emissions. To answer this question we must first review the provisions of the 1990 CAA Amendments with regard to onboard and Stage II controls. With this information, we can then examine the refueling emission control benefits with and without onboard controls, consistent with the statutory scheme for the implementation of onboard and

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and its prohibition against the use of unsafe devices applies durint the vehicle certification process pursuant to section 206(a)(3). In this case, however, EPA believes that Congress intended EPA to refer to the standards set forth in section 202(a)(4) (see, e.g., the House Report), in determining whether regulations that require onboard controls are safe and should be promulgated.

Stage II control approaches. This will be examined for both the nonattainment areas subject to Stage II and on a nationwide basis.

a. Statutory Provisions. The provisions governing onboard controls are contained in section 202(a)(6) of the CAA as amended in 1990. As detailed above, these provisions provide for onboard controls to be installed on light-duty vehicles only, beginning with the fourth model year after the year in which the onboard standards are promulgated. Controls would be phased-in as follows: 40 percent of the vehicles manufactured in the fourth model year, 80 percent in the fifth model year and 100 percent thereafter. Since section 202(a)(6) provides for EPA action on the onboard provision during the 1992 model year, were EPA to issue a rule, controls would presumably have started in the 1996 model year and been required on all new light-duty vehicles by 1998. Light-duty trucks and heavy-duty vehicles are not covered by the provisions of section 202(a)(6), although EPA could potentially include them under section 202(a)(1) authority.

The relevant provisions of the Act regarding Stage II controls are found in sections 182(b)(3), (c), (d) and (e); 323; 324; 184(b)(2); and 202(a)(6). The section 182 provisions require Stage II controls in moderate or worse ozone nonattainment areas and prescribe a schedule for the installation and operation of those controls at gasoline dispensing facilities within those areas. The schedule is based on the date of construction of the facility and the amount of fuel throughput per month. The provisions of section 182(b)(3) apply to facilities that dispense more than 10,000 gallons per month (gpm) of gasoline; however, independent small business marketers of gasoline (as defined in section 324), which dispense less than 50,000 gpm of gasoline, may be exempted from the Stage II requirements. The provisions of section 324 reiterate the exemption criteria mentioned above for independent small business marketers, define the term "independent small business marketer", and provide a 3-year phase-in for non-exempt independent marketers. Section 324 also permits each State to incorporate more stringent exemption levels than those discussed above. Section 323 establishes the general requirements for who is responsible for paying for installation of Stage II systems.

Section 184 also contains provision relating to Stage II. Section 184(a) creates an ozone transport region comprised of the States of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont, and the CMSA (Consolidated Metropolitan Statistical Area) which includes the District of Columbia. Under section 184(b)(2), EPA is to complete a study identifying alternative control measures capable of achieving emission reductions camparable to Stage II. The study is to be completed within three years after enactment of the 1990 CAA Amendments. After completion of the study, States in the ozone transport region would be required to adopt, within one year, the alternative measures or Stage II for all areas of the States that do not have such controls. To the extent that an area was already subject to Stage II, the State would not be required to adopt new measures for that area. In these States, Stage II may expand to some areas now in attainment with the ozone NAAQS or classified as marginal for ozone nonattainment.

Finally, as detailed above, section 202(a)(6) provides that the requirement for Stage II controls shall not apply in moderate ozone NA areas after promulgation of an onboard requirement. In addition, if an onboard rule is promulgated, EPA may also revise or waive Stage II requirements for serious, severe, or extreme ozone NA areas after EPA determines that onboard control systems are in widespread use throughout the motor vehicle fleet.

To summarize, the statute envisions either an integrated control strategy involving LDV onboard nationwide and Stage II in serious and worse ozone NA areas or a broader program of Stage II in moderate or worse ozone NA area. For ease of discussion, the former strategy will be referred to as the "onboard case" (even though it includes Stage II in serious or worse NA areas as well) and the latter will be referred to as the "Stage II case".

Having determined the statutory schedules and specifications for each of the two strategies, the next step is to determine the emission reductions afforded by each strategy. EPA has performed this anlaysis for the 55 ozone nonattainment (NA) areas that are required to install Stage II controls and for the nation as a whole. An analysis of the relative benefits in the nonattainment areas is appropriate in light of the fact that onboard would reduce emissions that contribute to ozone nonattainment. A nationwide analysis is also appropriate because onboard controls are a nationwide requirement and would reduce exposure to toxic emissions when onboard-equipped LDVs are refueled anywhere in the nation.

As presented below, EPA's analyses indicate that the emission reduction benefits of the onboard and Stage II cases differ in several ways. The onboard case would eventually produce large emission reductions overall. In the early years, however, onboard control requirements would make only a small contribution to the overall emission reductions achieved by the onboard case. Most of those reductions would be associated with Stage II controls in the worst ozone NA areas and in those States that have voluntarily adopted Stage II controls. The Stage II case, on the other hand, would produce faster and larger reductions in the areas with the greatest need for reductions in ozone-producing emissions and with greater population exposure to toxic emissions.

In light of Congress' concern with the safety of onboard controls, EPA believes it has discretion to accept some tradeoffs in emission reduction benefits to avoid a safety risk. Here, EPA is faced with a finding that canister-based onboard controls would increase the risk of vehicle fires. Stage II would safely provide greater benefits to the areas in greatest need in the most expeditious manner. As explained more fully below, under the circumstances EPA finds it reasonable to accept the risk-free reductions that Stage II would provide to avoid the risk onboard would pose. The earlier, targeted benefits of Stage II will afford more time for either safe onboard technologies to be developed or for EPA to take action under other provisions of the Act to reduce toxic emissions nationwide.

b. Methodology. Before describing the details of how the analysis is to be structured to assess the relative emission reductions achieved by the two statutory control strategies, information is needed on the implementation details and control effectiveness of each control technique. This is presented below for Stage II and onboard. Much of the data referred to below is taken from various reports in the record, and EPA has also compiled this information separately in a document in the public docket. (IV–B–21).

The information cited below for Stage II controls was taken in its entirety from the recently released EPA report entitled: "Technical Guidance—Stage II Vapor Recovery Systems for Control of Vehicle Refueling Emissions at Gasoline Dispensing Facilities," volume 1, EPA 450/3–91–022a. (IV–A–8) Among other topics, this report contains a detailed discussion of the legislation implementing Stage II, the NA areas affected by the statute, current Stage II programs around the country, and the effectiveness of Stage II in controlling refueling emissions under several exemption/enforcement scenarios. The report takes into account the various studies on Stage II efficiency submitted as part of this rulemaking.

Under the provisions of section 182, 55 ozone NA areas would be affected by Stage II: 1 extreme, 9 severe, 14 serious and 31 moderate (see Table 2-2 of the EPA Stage II report). If fully implemented, Stage II would apply to areas that distribute 43 percent of the nation's gasoline; 27.5 percent is in serious or worse areas (see Table 2-3 of the EPA Stage II report). Taking into account a range of exemption scenarios, Stage II would reduce refueling emissions in the areas where Stage II has been installed from 77 percent, assuming the 10,000/50,000 gpm exemptions are adopted, to 84 percent, assuming States adopt the more stringent provision and permit only 10,000 gpm exemptions for all facilities. This information is presented in Figure 4-15 of the EPA Stage II report. Both percentages assume annual enforcement, the most likely scenario according to the authors of the study.

The emission reduction benefits of equipping LDVs with onboard systems were determined using the leadtime, phase-in, and efficiency specifications of section 202(a)(6) as described above and the future gasoline use projections for 1996 and later model year vehicles and all gasoline vehicles from EPA's Mobile 4.1 fuel consumption model. (IV-A-9) The results of the fuel consumption model are shown in Table. 1.

The potential reductions provided by onboard-equipped LDVs are small at first and increase as fleet turnover occurs. As was discussed above, the onboard case also includes the additional reduction benefits of Stage II in serious or worse ozone NA areas. Stage II in these areas would provide reductions in addition to those provided by onboard, because Stage II would control refueling emissions from all current and future vehicles without onboard systems. The EPA Stage II report uses an efficiency of 77 to 84 percent. However, for modeling purposes under the onboard case, Stage II was assumed to have an efficiency of 80 percent.

TABLE 1:—MOBIL 4.1 FUEL CONSUMPTION

[Consumption figures are in billions of gallons per year]

Cal year	Fuel consumption			
	Nationwide		55 NA areas	
	LDGV*	All GV	LDGV*	All GV
1996	2.364	126.244	1.017	54.285
1997	8.469	128.439	3.642	55.229
1998	16.742	130.838	7.199	56.260
1999	25.122	133.335	10.802	57.334
2000	33.150	136.077	14.255	58.513
2001	40.921	138.832	17.596	59.698
2002	48.356	141.676	20.793	60.921
2003	54.846	144.622	23.584	62.187
2004	80.312	147.508	25.934	63.428
2005	65.209	150.521	28.040	64.724
2006	69.952	153.616	30.079	66.055
2007	74.711	156.735	32.126	67.396
2008	79.326	159.873	34.110	66.745
2009	83.535	163.068	35.920	70.119
2010	87.031	166.262	37.423	71.493
2011	89.707	169.133	38.574	72.727
2012	92.219	172.394	39.654	74.129
2013	94.578	175.692	40.669	75.548
2014	96.823	179.003	41.634	76.971
2015	96.942	182.348	42.545	76.410
1	2	3	4	5

*Represents the portion of total fuel consumption that would be consumed by onboard-equipped vehicles if onboard were implemented in 1996.

c. Nonattainment Areas. To conduct the analysis for the 55 ozone NA areas, the emission reduction benefits of the onboard and Stage II cases must be determined for those areas. The onboard case is discussed immediately below, followed by discussion of the Stage II case.

Under the provisions of the statute, for the onboard case the emission control benefits would be the sum of the reductions from: (1) Stage II controls in the serious and worse ozone NA areas; (2) LDV onboard systems in the moderate ozone NA areas; and (3) LDV onboard systems in the serious and worse NA areas, incremental to the reductions from Stage II in those areas, due to differences in control efficiency and exemptions from Stage II.

In assessing the onboard case benefits, EPA believes it appropriate to go beyond the statutory minimum and recognize that under State provisions, Stage II is present in six of the 31 moderate ozone NA areas. Given the fact that these Stage II systems are already in place, and the comments indicating the importance of these controls (IV-F-17), this analysis assumes that these Stage II controls would remain in place. Thus, if onboard controls were implemented, Stage II would be in place in a total of 30 ozone NA areas (6 moderate NA areas plus 24 serious or worse NA areas). According to Table 2-2 of the EPA Stage II report, these 30 areas represent 32.5 percent of the nationwide gasoline consumption; about five percent of this comes from the six moderate areas (i.e., those in the States of Florida, New Jersey, California and Missouri) and 27.5 percent comes from the 24 serious or worse ozone NA areas.

Finally, with regard to Stage II controls under the onboard case, as was mentioned above, the statute allows EPA to revise or waive Stage II requirements for serious or worse ozone NA areas after EPA determines that onboard controls are in widespread use throughout the motor vehicle fleet. As will be discussed below, the removal of these controls in the 55 NA areas would reduce the overall effectiveness of the onboard case.

For the Stage II case, the analysis is much simpler. Stage II is required to be in all 55 moderate or worse ozone NA areas. The percent of nationwide gasoline consumption covered (43 percent) and the emission reductions efficiency (77 to 84 percent) are as detailed in the EPA Stage II report.

Based on the implementation details and approaches discussed above, Table 2 compares the emission control effectiveness in the 55 ozone NA areas for the onboard and Stage II cases. The comparison is discussed below first on an annual basis and then on a time average annual basis.

1. Annual Basis. As is shown in columns 4 and 5 of Table 2, the State II case (no onboard) provides a constant annual reduction of 77 to 84 percent throughout the entire period. This is the case because, pursuant to section 182(b)(3), Stage II would be fully implemented by the time onboard controls began in the 1996 model year.

The onboard case includes LDV onboard controls and Stage II in 30 NA areas. Control would begin in 1996 with Stage II in place in the 30 NA areas discussed above; the remainder of the control would come from LDV onboard systems and would phase in as the fleet turns over. As is shown in column 11 of Table 2, even though the annual effectiveness of the onboard case eventually approaches that achieved in the Stage II case, it does not occur until more than ten years into the program. Depending on the exemption level assumed for the Stage II case, the onboard case may never achieve the same level of effectiveness as the Stage II case. Also, columns 9 and 10 of Table 2 provide information on the portion of the reduction in the 55 NA areas which is attributable to onboard controls. Onboard controls provide at most only about 25 percent of the reductions achieved in the onboard case; the remaining 75 percent comes from the Stage II in the 30 NA areas. Also, in the early years, the Stage II cases provides greater reductions than the onboard case because Stage II would be in place at the outset in all 55 NA areas and would control refueling emissions from all three vehicle classes.

2. Time Average Basis. Since under the Stage II case controls would be fully implemented in the 55 NA areas prior to the start of the onboard case, the average emission reductions that the Stage II case would achieve over time would be the same as the annual emission reductions—77 to 84 percent.

For the onboard case, Table 2 shows that the emission reductions would phase in and average reductions by the year 2015 would be approximately 75 percent, a bit less than for the Stage II case. Moreover, as was the case on an annual basis, at least 75 percent of the onboard case reductions would be attributable to stage I in the 30 NA areas. Also, as was the case on an annual basis, the Stage II case provides greater average reductions in the 55 NA areas than does the onboard case.

The greater VOC reductions achieved with the Stage II case would translate into increased reductions in air toxic emissions, as well. These results would be obtained because Stage II would control fuel dispensed to all classes of motor vehicles while, under section 202(a)(6), the onboard requirement would apply to only light-duty vehicles. Based on the Mobile 4.1 Fuel Consumption Model, approximately 40 percent of gasoline is consumed by light-duty trucks and heavy-duty vehicles. Thus, for the NA areas in greatest need of ozone precursor reductions, Stage II provides earlier and more effective control.

TABLE 2—NONATTAINMENT AREA CONTROL EFFECTIVENESS, ONBOARD VS STAGE II

[Consumption figures are in billions of gallons per year]

Cal year	Stage II case (55 areas)				Onboard case						
	Contr consumpt		Contr effectvness (percent)		Controlled consumption*			Control (percent)		Contr effectvns (percent)	
	SII-10/10	SII-10/50	SII-10/10	SII-10/50	O/B incr	STG II (30)	Total	O/B Incr	STGII(30)	Total	Time Avg
1996	45.599	41.799	84.0	77.0	0.382	32.823	33.205	1.1	98.9	61.2	61.2
1977	46.392	42.526	84.0	77.0	1.368	33.394	34.762	3.9	96.1	62.9	62.1
1998	47.259	43.320	84.0	77.0	2.704	34.016	36.722	7.4	92.6	65.3	63.2
1999	48.161	44.147	64.0	77.0	4.057	34.667	38.724	10.5	89.5	67.5	64.3
2000	49.151	45.055	84.0	77.0	43.354	35.380	40.734	13.1	86.9	69.6	65.4
2001	50.146	45.967	84.0	77.0	6.609	36.096	42.705	15.5	84.5	71.5	66.5
2002	51.173	46.909	84.0	77.0	7.809	36.836	44.645	17.5	82.5	73.3	67.5
2003	52.237	47.884	84.0	77.0	8.858	37.602	46.459	19.1	80.9	74.7	68.5
2004	53.280	48.840	84.0	77.0	9.740	38.352	48.092	20.3	79.7	75.8	69.3
2005	54.368	49.838	84.0	77.0	10.531	39.135	49.667	21.2	78.8	76.7	70.2
2006	55.486	50.862	84.0	77.0	11.297	39.940	51.237	22.0	78.0	77.6	70.9
2007	56.613	51.895	84.0	77.0	12.066	40.751	52.817	22.8	77.2	78.4	71.6
2008	57.746	52.934	84.0	77.0	12.811	41.567	54.378	23.6	76.4	79.1	72.2
2009	58.900	53.992	84.0	77.0	13.491	42.398	55.889	24.1	75.9	79.7	72.8
2010	60.054	55.049	84.0	77.0	14.056	43.228	57.284	24.5	75.5	80.1	73.4
2011	61.091	56.000	84.0	77.0	14.488	43.975	58.462	24.8	75.2	80.4	73.9
2012	62.269	57.080	84.0	77.0	14.893	44.822	59.716	24.9	75.1	80.6	74.4
2013	63.460	58.172	84.0	77.0	15.274	45.680	60.954	25.1	74.9	80.7	74.8
2014	64.656	59.268	84.0	77.0	15.637	46.541	62.178	25.1	74.9	80.8	75.1
2015	65.864	60.375	84.0	77.0	15.979	47.410	63.390	25.2	74.8	80.8	75.5
1	2	3	4	5	6	7	6	9	10	11	12

*Represents the incremental control attributable to onboard in the 55 areas plus control due to stage II requirements in the 30 nonattainment areas.

Note: Control effectiveness represents emission reductions as a percentage of total consumption controlled by the onboard case in the 55 nonattainment areas. For stage II, it is the percentage controlled for all gasoline vehicles. Stage II scenarios represent 10/10 exemptions or 10/50 exemptions; with annual inspections. Assumes 95% onboard control efficiency.

d. Nationwide Assessment. In assessing the relative nationwide benefits of the onboard and Stage II cases, the appropriate comparison is between the additional benefits achieved by onboard nationwide incremental to the benefits of Stage II in the 30 NA areas described earlier and the benefits of Stage II in all 55 NA areas.

In this analysis, the onboard case is similar to that described for the NA areas, except the scope of coverage is greater. For the onboard case the emission reduction benefits would be based on: (1) Stage II controls in the 30 ozone NA areas as described previously, (2) the onboard system reductions for LDV fuel consumption in the remainder of the country and, (3) the onboard system reductions for LDV fuel consumption in the 30 ozone NA areas with Stage II, due to the incremental differences in overall control effectiveness and exemptions from Stage II.

Regarding the onboard case, as was the situation with the NA area analysis, Stage II in 30 NA areas accounts for 32.5 percent of national gasoline consumption. See Table 3. When adjusted for Stage II efficiency (for convenience, modeled at 80 percent in the onboard case), the effectiveness is 26 percent on a nationwide basis. Onboard systems would capture LDV refueling vapors in moderate and marginal ozone NA areas and in other attainment areas, as well as the LDV portion of those vapors not controlled by Stage II in the 30 ozone NA areas. In all, over the long term, LDV onboard systems could potentially control approximately 40 percent of nationwide refueling emissions beyond those which would be controlled by Stage II systems. However, as was seen with the NA area comparison, the onboard case effectiveness is a function of fleet-turnover, and this control would not be achieved in full until fleet turnover is complete.

For the Stage II case, the situation is essentially the same as the NA area presentation. However, since this is based on nationwide fuel consumption, the overall control effectiveness is reduced because Stage II is statutorily required only in the 55 ozone NA areas. Thus, instead of 77 to 84 percent control as in the NA areas, the Stage II case reduces emissions 33 to 36 percent on a nationwide basis since Stage II would cover only 43 percent of the nationwide gasoline consumption. As was the case with the NA area discussion above, all Stage II would be in place by 1996 so the 33 to 36 percent reductions in emissions is constant.

1. Annual Basis. A comparison of the annual emission reductions, or effectiveness, of the onboard and Stage II cases is shown in Table 3. For the Stage II case, as is shown in columns 4 and 5, annual reductions are a constant 33 to 36 percent. For the onboard case, column 11 shows that annual reductions start out lower than that of the Stage II case, and a comparison of columns 2 and 3 with column 8 shows that reductions from the Stage II case exceed those from the onboard case for the first few years. After that point, annual onboard case reductions meet and surpass those from the Stage II case. At its maximum in 2015, a comparison of columns 4 and 5 with column 11 gives a difference of about 30 percentage points. However, comparing columns 2 and 3 of Table 2 with columns 7, 8 and 9 of Table 3, it can be seen that most of this incremental difference is due to reductions outside of the 55 NA areas.

2. Time Average Basis. Since all expected Stage II controls would be in place in 1996, columns 4 and 5 of Table 3 show that the Stage II case would achieve constant average reductions of 33 to 36 percent. For the onboard case the control would be phased in, so reductions on a time average basis would be less than that on an annual basis. As is shown in column 12 of Table 3, average reductions from the onboard case would be less than that for the Stage II case for the first five years of the program, after which the average reductions of the onboard case would exceed that of the Stage II case. However, once again, most of this increase in average reductions would come as a result of increasing reductions outside of the 55 NA areas.

TABLE 3—NATIONWIDE CONTROL EFFECTIVENESS, ONBOARD AND STAGE II

[Consumption figures are in billions of gallons per year]

Cal year	Stage II case (55 areas)				Onboard case						
	Contr consumpt		Contr effectvness (percent)		Controlled consumption *			Control (percent)		Contr effectvns (percent)	
	SII-10/50	SII-10/10	SII-10/50	SII-10/10	O/B incr	STG II (30)	Total	O/B incr	STG II (30)	Total	Time avg
1996	41.787	45.574	33.1	36.1	1.662	32.823	34.485	4.8	95.2	27.3	27.3
1997	42.513	46.366	33.1	36.1	5.954	33.394	39.348	15.1	84.9	30.6	29.0
1998	43.307	47.233	33.1	36.1	11.770	34.018	45.788	25.7	74.3	35.0	31.0
1999	44.134	48.134	33.1	36.1	17.661	34.667	52.328	33.8	66.2	39.2	33.1
2000	45.041	49.124	33.1	36.1	23.304	35.380	58.684	39.7	60.3	43.1	35.2
2001	45.953	50.118	33.1	36.1	28.767	36.096	64.864	44.4	55.6	46.7	37.2
2002	46.895	51.145	33.1	36.1	33.994	36.836	70.830	48.0	52.0	50.0	39.2
2003	47.870	52.209	33.1	36.1	36.557	37.602	76.158	50.6	49.4	52.7	41.0
2004	48.825	53.250	33.1	36.1	42.399	38.352	60.751	52.5	47.5	54.7	42.6
2005	49.822	54.338	33.1	36.1	45.842	39.135	84.977	53.9	46.1	56.5	44.1
2006	50.847	55.455	33.1	36.1	49.176	39.940	89.118	55.2	44.8	58.0	45.5
2007	51.879	56.581	33.1	36.1	52.522	40.751	93.273	56.3	43.7	59.5	46.8
2008	52.918	57.714	33.1	36.1	55.766	41.567	97.333	57.3	42.7	60.9	48.0
2009	53.976	58.868	33.1	36.1	58.725	42.398	101.123	58.1	41.9	62.0	49.2
2010	55.033	60.021	33.1	36.1	61.183	43.228	104.411	58.6	41.4	62.8	50.2
2011	55.983	61.057	33.1	36.1	63.064	43.975	107.039	58.9	41.1	63.3	51.2
2012	57.062	62.234	33.1	36.1	64.830	44.822	109.652	59.1	40.9	63.6	52.0
2013	58.154	63.425	33.1	36.1	66.488	45.680	112.168	59.3	40.7	63.8	52.8
2014	59.250	64.620	33.1	36.1	68.067	46.541	114.607	59.4	40.6	64.0	53.5
2015	60.357	65.828	33.1	36.1	69.556	47.410	116.967	59.5	40.5	64.1	54.1
1	2	3	4	5	8	7	8	9	10	11	12

* Represents the incremental control attributable to onboard nationwide plus control due to stage II requirements in the 30 nonattainment areas.

Note: Control effectiveness represents emission reductions as a percentage of total consumption controlled by the onboard case nationwide.

For stage II it is the percentage of total consumption controlled by stage II installed in the 55 NA areas. Stage II scenarios represent 10/10 exemptions or 10/50 exemptions; with annual inspections. Assumes 95% onboard control efficiency.

e. Additional Considerations. Analyses, such as this, which use models to compare the effectiveness of emission control strategies, often require that certain assumptions, judgments, and estimations be used in developing the parameters and scenarios for the model. In these situations, a sensitivity analysis is normally undertaken to assess how realistic changes in the key assumptions, judgments, and estimations might affect the results. Such an analysis was prepared for this comparison, and the results are presented below. Except as noted below, the sensitivity analysis applies to both the NA area and nationwide analyses. Overall, the sensitivity analysis indicates that the Stage II case may be more effective, and the onboard case less effective, than the foregoing analysis suggests.

1. Stage II Technology. For the reasons discussed below, the control effectiveness of the Stage II case is probably understated. First, absent an onboard requirement, if Stage II is adopted statewide in the ozone transport states under section 184(b)(2), an analysis of Tables 2–2 and 2–3 of the EPA Stage II report indicates that the percent of nationwide gasoline consumption covered by Stage II would increase by 6 percentage points (43 to 49 percent). This would increase the overall effectiveness of the Stage II case by five percentage points. Thus, the Stage II case effectiveness would increase to 38 to 41 percent nationwide. Second, as has been discussed above, Stage II would be in place prior to 1996. In most cases, installations would be

completed by the end of 1994, which provides two years of additional benefits under the Stage II case for the moderate NA areas which do not presently have Stage II. This increases the overall average effectiveness of the Stage II case as compared to the onboard case. These areas represent about 12.5 percent of the fuel consumption, and applying the 77 to 84 percent control efficiency for Stage II, a 10 percent increase in control effectiveness would be gained for an additional two years under the Stage II case. Third, there are a number of other minor factors to consider. States implementing Stage II controls in moderate NA areas could implement more stringent exemption levels or enforcement programs than those now being used in most States which have Stage II. Also, as is discussed in the EPA Stage II reports, if present trends continue, new service station facilities will tend to be larger than the smaller, lower throughput facilities they replace, and would thus be more likely to be subject to Stage II requirements. In addition, Stage II controls may provide some control of underground storage tank emptying loss emissions, especially in periods of lower vehicle fueling activity. These three points considered together could increase the effectiveness of the Stage II case by 1 to 2 percentage points. Finally, it should be noted that one gasoline marketing company has introduced a vapor recovery nozzle which is not subject to the efficiency losses which can occur due to lack of maintenance on current Stage II hardware. (IV–D–715, IV–A–8) This "bellowless nozzle", would presumably have a control efficiency much closer to the 95 percent certification value suggested for new Stage II nozzles in the EPA Stage II report. If nozzle designs of this type are used widely, this could improve the efficiency of the Stage II controls. Each percentage point increase in the average control efficiency of the Stage II hardware translates into almost a one percentage point increase in the effectiveness of the Stage II case which relies solely on Stage II controls but somewhat less for the onboard case.

2. Onboard Technology. Also, the effectiveness of the onboard case may be overstated. The analysis used the 95 percent control effectiveness called for in the statute. And, while there is data in the record to indicate that this level of control efficiency can be met and perhaps surpassed on new vehicles, there is little data to indicate how the LDV onboard systems would perform in use. In the August 1987 NPRM, EPA discussed the in-use control efficiency for onboard systems and based on the in-use performance of evaporative controls estimated that the reduction in control efficiency could be as high as 2.5 percentage points (52 FR 31185). Using essentially the same data, others have suggested an in-use control efficiency reduction of six percent (IV–H–03). Of course, predicting this impact is problematic since there is little in-use data for onboard systems and initiatives such as RVP control, enhanced inspection and maintenance based on transient testing and evaporative emission control system checks, and onboard emission control system diagnostics could have a salutary effect.

Also, the onboard case includes Stage II in 30 ozone NA areas. If the six moderate NA areas with Stage II were no longer to require such systems, the efficiency of the onboard case would be decreased, especially in the early years. Similarly, under section 202(a)(6), EPA may revise or waive the Stage II requirements in the serious and worst ozone NA areas when onboard systems are in widespread use throughout the motor vehicle fleet. While it is not clear if this would occur and if so, when, an analysis of the information in Tables 2 and 3 indicates that the loss of the Stage II control applied to gasoline-powered light-duty trucks and heavy-duty vehicles would decrease the control effectiveness of the onboard case by about five to ten percentage points depending on when implemented (presumably after 2005 when much of the pre-onboard fleet would have been retired). Thus, the overall control effectiveness of the onboard case could be reduced in the long term.

There thus are a number of factors which could directionally reduce the effectiveness of the onboard case and increase the effectiveness of the Stage II case. Using the information presented above, the effectiveness of the onboard case could be reduced by about 10 percentage points while the effectiveness of the Stage II case could increase by 6 to 8 percentage points or perhaps more if the bellowless nozzle design comes into widespread use. This brings the average nationwide effectiveness value to 44 percent for the onboard case (assuming that Stage II is phased out of the serious and worse ozone NA areas in 2005) and 39 to 44 percent for the Stage II case.

Furthermore, in the later years when the annual effectiveness of the onboard case is projected to surpass that of the Stage II case, the underlying predictions of gasoline consumption are problematic. There is presently a strong interest in alternative fuels and initiatives are now underway through Federal, State, and local legislation to require more use of these fuels. Thus, fuel use characteristics—and the need for and effectiveness of refueling emission controls—could change substantially.

Finally, EPA recognizes that the Stage II case and the onboard case would not provide emission reductions in the same geographic areas. While the Stage II case provides the VOC emission reductions earlier and where most needed, it would not provide reductions in air toxic emissions to the remainder of the nation. Conversely, the onboard case would provide a more even distribution of reductions in air toxic emissions, but would not provide as large or timely a reduction for the ozone NA areas as the Stage II case would provide, especially in the moderate NA areas which would be relieved of Stage II under section 202(a)(6). These NA areas, moreover, are generally urban. While the absence of onboard controls would mean a loss of potential air toxic emission reductions nationwide, the Stage II reductions would come more in urban areas with greater population exposure potential.

When evaluating the need for refueling emission controls, EPA has historically considered health effects concerns related to exposure to benzene and other gasoline vapors. However, the potency of gasoline vapor in causing adverse health effects is unclear. It is presently classified as a B–2 (probable human) carcinogen, but newer evidence suggests that its potency should be downgraded to a class C (possible human) carcinogen. (IV–A–10) While there is no uncertainty about benzene, EPA has direct regulatory authority to control mobile source related air toxics including benzene emissions (consistent with section 202(a)). Section 202(1) requires a study of mobile source related air toxics, followed by regulations to control such toxics applying at a minimum to emissions of benzene, formaldehyde and 1,3 butadiene. The issues of control of benzene exposures from vehicle refueling will be addressed pursuant to these provisions. Thus, the need to focus on air toxics as a central aspect of this analysis is somewhat diminished as compared to the importance of ozone precursors. On balance, EPA believes that the nationwide reduction in air toxics which the onboard case would provide is of less importance than the greater focused reductions in ozone precursors and toxic emissions in ozone NA areas that the Stage II case would provide.

In summary, as was shown above, the Stage II case would provide earlier and more effective control in the 55 ozone NA areas in greatest need of such reductions. While the onboard case provides greater control on a nationwide basis, its reductions in ozone precursors would not be as early or as great in the moderate ozone NA areas. Moreover, there is reason to believe given the sensitivities of the analyses that the Stage II case would achieve average nationwide reductions comparable to the onboard case nationwide reductions.

EPA recognizes that the Stage II case would not provide exactly the same emission reductions as the onboard case. In light of the safety risk posed by onboard controls, however, the Agency believes that the reductions afforded by the Stage II case make it unwise to proceed with onboard requirements at this time. Stage II will safely provide, earlier and more effective control to the areas most in need. Indeed, Stage II may provide reductions measured on a nationwide basis equivalent in quantity to those onboard would have achieved. To the extent Stage II proves not to achieve needed reductions, other means exist to provide reductions, such as controls under section 202(1), and other onboard technologies may be developed in place of the canister systems found to pose an unreasonable safety risk. In light of these considerations, EPA finds that the reductions achievable by the Stage II case are appropriately viewed as comparable to those achievable by the onboard case.

f. Costs and Cost Effectiveness. As a part of the previously mentioned gasoline 1984 marketing study and the subsequent NPRM for onboard controls, EPA conducted an in-depth study of the costs and cost effectiveness of onboard and Stage II controls in both NA areas and on a nationwide basis. This analysis is set forth in the draft Regulatory Impact Analysis (RIA) for the onboard NPRM and is available in the public docket. (II–A–18,19,20).

Subsequent to the NPRM, there have been several developments which must be considered in this discussion. First, the number of areas and the specific NA areas affected by Stage II has changed. This affects the percent of fuel consumption and the number of service stations requiring Stage II. The current situation requires Stage II in 55 NA areas involving 43 percent of nationwide fuel consumption. The previous analysis involved 61 NA areas but only 35 percent of fuel consumption. Second, onboard was phased-in and limited to LDVs only. This reduces the overall costs and emission reductions substantially as compared to those in the draft 1987 RIA. Third, the onboard case involves a limited amount of Stage II as well which requires combination of some portion of the onboard and Stage II analyses.

Furthermore, in response to comments on the August 1987 NPRM, on December 22, 1988 EPA released an updated analysis of onboard costs. (IV–B–19) This analysis indicated that for a simple onboard system, onboard costs incremental to enhanced evaporative emission controls would be less than the $14–$19 estimate in the NPRM (52 FR 31177). These lower costs were due to onboard system design simplications EPA believed to be possible, improved cost estimates for enchanced evaporative controls and fuel recovery credits. However, a number of manufacturers have indicated that simple systems such as suggested by EPA may not be workable and more costly approaches may be needed. If this is the case, costs will be closer to the values presented in the NPRM. Enhanced evaporative controls have not yet been implemented under section 202(k), so it is not clear precisely what will be required. Thus, EPA is not now in a position to determine the costs of an onboard system incremental to the costs of enchanced evaporative control.

Also, as part of the response to section 182(b)(3) requirements for Stage II, EPA updated the assessment of Stage II costs and cost effectiveness. As is reflected in chapter 5 of the previously cited EPA report on Stage II, costs are slightly less and the efficiency is essentially the same as estimated in the 1987 RIA. Thus, the cost effectiveness is still about the same as indicated in the draft RIA (see Table 5–12). Thus Stage II remains a very cost effective VOC control technology.

Nonetheless, the best information now available suggests that much of the data used in the 1987 RIA remains valid. The unit costs and effectiveness remain largely unchanged. The key changes involve the change in the amount of fuel consumption in the 55 NA areas (and of course indirectly the number of service stations), limiting the onboard requirements to only LDV's and a combination of onboard and Stage II controls in the onboard case. For the purposes of this analysis, the figures used in the 1987 analyses will be used with appropriate updating for the changes mentioned above. Costs and cost effectiveness are discussed below for the 55 NA areas, nationwide, and then onboard incremental to Stage II.

First, with regard to the 55 NA areas, the costs and cost effectiveness of the Stage II case are very close to those figures reflected in Table 3–19 of the 1987 RIA. After scaling for increased fuel consumption, annualized costs are approximately $117–$160 million per year and the cost effectiveness is in the range of $1000–$1100 per megagram (Mg) (see Table 3–19 of the 1987 draft RIA or Table 5–13 of the EPA stage II report). For the onboard case, the costs of the Stage II control are reduced in proportion to the fractions of the fuel consumption in these areas (32.5/43). Stage II costs thus are approximately $88 to $121 million. Onboard technology is required on LDVs nationwide but the benefits are counted only in the 55 NA areas. Using the LDV portion of the costs in the 1987 RIA, the annualized costs for LDV onboard are approximately $129 million per year. Thus, the total cost is $217 to $250 million per year and the cost effectiveness increases to about $1750 per Mg. The Stage II case is much more cost effective and less costly. This is primarily the case because onboard and Stage II are largely redundant for LDV's.

Second, on a nationwide basis, the costs and cost effectiveness for the Stage II case are the same as in the NA area analyses above. For the onboard case, the costs are similar to those presented above, but the reductions cover Stage II in 30 NA areas and LDVs nationwide as well. Thus, in this case the costs are approximatley $217 to $250 million per year and the cost effectiveness is about $1250 per Mg. Once again the Stage II case entails less total cost and is more cost effective.

Finally, there are a few additional points worth considering in this comparison. First, Stage II is presently in place in 6 of the 25 moderate NA areas which would have to install Stage II in the Stage II case but not the onboard case. These facilities contribute about 5 percent of nationwide gasoline consumption and 12 percent of the control which would be achieved in the Stage II case. The investment in Stage II in these areas represents sunk costs which could arguably be subtracted from the total costs under the Stage II case in both the NA areas and nationwide analyses. This would lead to a lower overall cost.

Also, it is important to note that at a minimum Stage II will be in place in 30 NA areas representing 32.5 percent of fuel consumption. If the additional reductions from LDV onboard are viewed incremental to the Stage II that is or will be in place, the marginal cost effectiveness is $5600 per Mg in the NA area analysis and $1400 in the nationwide case. These values are very high relative to those for the Stage II case alone.

Based on the information available this analysis suggests that both the onboard and Stage II cases have attractive cost effectiveness values, especially compared to other VOC control strategies now required under the 1990 CAA Amendments. However, given the provisions of the statute for onboard and Stage II controls, the analysis indicates that the Stage II case is the more cost effective control strategy.

V. Future Technology

Since NHTSA's safety report covers only canister-based onboard systems, today's decision is based on systems of this design. While other vehicle-based control technologies might be developed to control refueling emissions, this rulemaking has dealt almost exclusively with the question of imposition of canister-based onboard controls. Some commenters suggested that EPA should proceed to require onboard systems now, and work out safety concerns before the rule would take effect. For several reasons, EPA is not adopting this approach. First, as to canister-based systems, the record does not demonstrate that the safety risks are entirely capable of resolution. Other technolgies have been suggested for the refueling control, but they are only in the preliminary stages of development and, therefore, could not be analyzed. Too little is known about these alternatives for EPA to base an onboard requirement on them at this time. Moreover, the 1990 legislation did not purport to apply to alternative, non-canister-based onboard systems. (See H. Rep. No. 490 at 303–04, discussing only the onboard system serving as the basis for EPA's 1987 proposal, namely canister-based controls; see also Cong. Rec. of Oct. 24, 1990 at S 18038, summarizing section 202(a)(6) as requiring installation of canisters provided EPA and DOT find that canister-based technology is safe). Indeed, the capture efficiency specified for onboard controls by section 202(a)(6) is based on a canister system, indicating that Congress intended promulgation of onboard requirements on the prescribed schedule only if canister-based systems were found safe. Finally, since Congress directed EPA to consult with NHTSA before promulgating any onboard requirement, Congress expected NHTSA's advice to relate to currently available technology—i.e., canister-based systems. Thus, EPA is not in a position today to predict reliably when or whether such new (non-canister) technologies might be developed, nor to consider the safety of such as-yet undeveloped technology. As a result, EPA could not reasonably base an onboard requirement on them. EPA will continue to monitor technical developments for other onboard systems, including diaphragms, bladders, and other capture technologies (e.g., activated carbon or chemically activated polymer absorbers impregnated on porous foam filters) which may substantially reduce or control refueling emissions and raise fewer concerns about vehicle safety. (IV–D–762, IV–E–96).

VI. Unique Aspects of This Decision

It is important to distinguish the unique aspects of today's action that differ from other similar regulatory programs. In the decision at hand, an alternative to vehicle-based controls is available which raises no question of increased safety risk. Much of the rationale supporting the decision not to implement onboard requirements hinges on the ready availability of Stage II controls. In this case, however, NHTSA has found that the introduction of onboard canister-based controls would increase the risk of vehicle fires in a manner that could never be entirely redressed. In the context of the section 202(a)(6) requirement that EPA consider the safety of onboard controls before promulgating an onboard rule, EPA finds that the safety risk associated with onboard controls—measured against the availability of an alternative control strategy of comparable effectiveness—leads to the conclusion that onboard controls should not be required.

A second distinguishing factor concerns the degree of risk associated with the introduction of new technology. EPA does not believe that increased risk is an automatic consequence of technological change. It is a broadly accepted fact that today's vehicles, with their highly sophisticated and complex designs, are safer than were the simpler vehicles of the past. Clearly, the degree to which new technology increases total risk is a function of many factors. New hardware introduces new failure modes and less well proven designs; however, they often replace undesirable systems and thus could directionally improve safety. Also, such sources of potential risk are affected to varying degrees by the risk environment into which they are introduced. For example, new hardware to cure an existing safety risk would generally be seen as providing a net reduction in risk. Similarly, new emission controls that replace or upgrade already existing controls could increase risk, have no impact on risk, or even reduce risk, depending upon the balance of their reliability and safety factors compared to the existing controls.

Finally, the existence of risk is not in itself an absolute bar to regulation requiring the introduction of new technology to reduce emissions. The emission reductions themselves are beneficial to society, or they would not be imposed. Thus, a marginal increase in risk may well be appropriate to obtain a given degree of emission reduction. For example, in adopting greatly reduced emission levels for both conventional and clean-fueled vehicles, the Congress clearly believed that any associated risk factors could be adequately controlled in the process of technology development. However, in the case of onboard controls, Congress made the issue of canister safety a critical factor in the Agency's decision to promulgate the onboard requirement. NHTSA and EPA have both found central to that issue the availability of a safe, alternative means of achieving comparable emission reductions. In these circumstances, the Agency believes it appropriate to avoid the risk posed by canister-based onboard controls by not promulgating the onboard requirement and instead relying on Stage II controls to achieve refueling emission control.

In summary, EPA considers this rulemaking to be a unique situation. While safety is always an important consideration, and EPA will continue to review the potential safety implications of all mobile source-related regulatory actions with NHTSA, EPA believes that situations where safety becomes the prime determinant of action will continue to be rare. In this rulemaking, however, where Congress required EPA to consider the safety of the controls before requiring them, and intended EPA to decline to require them if they are found to be unsafe, safety concerns appropriately play a role that is not common in mobile source rulemakings under the CAA.

VII. Finding

As required by section 202(a)(6) of the Clean Air Act, EPA has consulted with the Secretary of Transportation regarding the safety of vehicle-based (onboard) systems for the control of refueling emissions. For the reasons explained above, EPA finds reasonable and adopts NHTSA's conclusion that onboard systems would have a negative impact on safety. Stage II controls are a viable alternative to onboard controls for light-duty vehicles. They provide comparable emission control effectiveness without accompanying concerns about safety risks. In light of these findings regarding onboard and Stage II controls, EPA concludes that onboard canister controls pose an unreasonable safety risk. Therefore, the Agency has decided not to promulgate the onboard requirements at this time.

Dated: March 27, 1992.

William K. Reilly,

Administrator.

[FR Doc. 92-7740 Filed 4-14-92; 8:45 am]

BILLING CODE 6560-50-M