Sunshine Act Meetings

Federal Register
Vol. 54, No. 54
Wednesday, March 22, 1989

This section of the FEDERAL REGISTER contains notices of meetings published under the "Government in the Sunshine Act" (Pub. L. 94-409) 5 U.S.C. 552b(e)(3).

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TIME AND DATE: Monday, April 3, 1989, 10:00 a.m.

PLACE: 1111 20th Street, NW., Suite 450, Washington, DC 20036.

STATUS: Closed pursuant to a vote taken March 16, 1989.

MATTERS TO BE CONSIDERED: Adjudication in the 1986 cable royalty fee distribution proceeding.

CONTACT PERSON FOR MORE INFORMATION: Robert Cassler, General Counsel, Copyright Royalty Tribunal, 1111 20th Street, NW., Suite 450, Washington, DC 20036, 202–653–5175.

Dated: March 17, 1989.

Edward W. Ray,

Chairman.

Copyright Royalty Tribunal

Certification of Closed Meeting

The General Counsel of the Copyright Royalty Tribunal hereby certifies, pursuant to 5 U.S.C. 552b(f)(1), and pursuant to § 301.14(b) of the Tribunal's rules, 37 CFR 301.14(b), that the Tribunal's deliberations concerning the hearing of the 1986 cable royalty fee distribution hearing scheduled to occur on April 3, 1989 (and from time to time thereafter up to 30 days as the Tribunal may, pursuant to 37 CFR 301.14(a), find appropriate) may properly be closed to public observation.

The relevant exemptions on which this certification is based are set forth in the following provisions of law:

5 U.S.C. 552b(c)(10) (adjudication)

37 CFR 301.13(i) (adjudication)

The recorded vote of each Commissioner taken March 16, 1989 on the question of a closed meeting is as follows:

Chairman Edward W. Ray—Yes

Commissioner Mario F. Aguero—Yes

Commissioner J. C. Argetsinger—Yes

It is anticipated that, in addition to the Commissioners of the Tribunal, the General Counsel and each of the Commissioners' confidential assistants will attend the Tribunal's deliberations.

Dated: March 17, 1989.

Robert Cassler,

General Counsel.

[FR Doc. 89–6891 Filed 3–20–89; 3:28 pm]

BILLING CODE 1410–09–M

MISSISSIPPI RIVER COMMISSION

TIME AND DATE: 9:00 a.m., April 17, 1989.

PLACE: On board MV Mississippi at foot of Eighth Street, Cairo, IL.

STATUS: Open to the public.

MATTERS TO BE CONSIDERED: (1) Report by president on general conditions of the Mississippi River and Tributaries Project and major accomplishments since the last meeting; (2) Views and suggestions from members of the public on any matters pertaining to the Flood Control, Mississippi River and Tributaries Project; and (3) District Comander's report on the Mississippi River and Tributaries Project in Memphis District.

CONTACT PERSON FOR MORE INFORMATION: Mr. Rodger D. Harris, telephone 601–634–5766.

Rodger D. Harris,

Executive Assistant, Mississippi River Commission.

[FR Doc. 89–6860 Filed 3–20–89; 12:06 pm]

BILLING CODE 3710–GX–M

MISSISSIPPI RIVER COMMISSION

TIME AND DATE: 9:00 a.m., April 18, 1989.

PLACE: On board MV Mississippi at City Front, vicinity of Beale Street, Memphis, TN.

STATUS: Open to the public.

MATTERS TO BE CONSIDERED: (1) Report by president on general conditions of the Mississippi River and Tributaries Project and major accomplishments since the last meeting; and (2) Views and suggestions from members of the public on any matters pertaining to the Flood Control, Mississippi River and Tributaries Project.

CONTACT PERSON FOR MORE INFORMATION: Mr. Rodger D. Harris, telephone 601–634–5766.

Rodger D. Harris,

Executive Assistant, Mississippi River Commission.

[FR Doc. 89–6861 Filed 3–20–89; 12:06 pm]

BILLING CODE 3710–GX–M

MISSISSIPPI RIVER COMMISSION

TIME AND DATE: 3:30 a.m., April 19, 1989.

PLACE: On board MV Mississippi at City Front, Foot of Crawford Street, Vicksburg, MS.

STATUS: Open to the public.

MATTERS TO BE CONSIDERED: (1) Report by president on general conditions of the Mississippi River and Tributaries Project and major accomplishments since the last meeting; (2) Views and suggestions from members of the public on any matters pertaining to the Flood Control, Mississippi River and Tributaries Project; and (3) District Commander's report on the Mississippi River and Tributaries Project in Vicksburg District.

CONTACT PERSON FOR MORE INFORMATION: Mr. Rodger D. Harris, telephone 601–634–5766.

Rodger D. Harris,

Executive Assistant, Mississippi River Commission.

[FR Doc. 89–6862 Filed 3–20–89; 12:06 pm]

BILLING CODE 3710–GX–M

MISSISSIPPI RIVER COMMISSION

TIME AND DATE: 9:00 a.m., April 21, 1989.

PLACE: On board MV Mississippi at Foot of Prytania Street, New Orleans, LA.

STATUS: Open to the public.

MATTERS TO BE CONSIDERED: (1) Report by president on general conditions of the Mississippi River and Tributaries Project and major accomplishments since the last meeting; (2) Views and suggestions from members of the public on any matters pertaining to the Flood Control, Mississippi River and Tributaries Project; and (3) District Commander's report on the Mississippi River and Tributaries Project in New Orleans District.

CONTACT PERSON FOR MORE INFORMATION: Mr. Rodger D. Harris, telephone 601–634–5766.

Rodger D. Harris,

Executive Assistant, Mississippi River Commission.

[FR Doc. 89–6863 Filed 3–20–89; 12:06 pm]

BILLING CODE 3710–GX–M

NATIONAL MEDIATION BOARD

TIME AND DATE: 2:00 p.m., Wednesday, April 5, 1989.

PLACE: Board Hearing Room 8th Floor, 1425 K. Street, NW. Washington, DC.

STATUS: Open.

MATTERS TO BE CONSIDERED:

1. Ratification of the Board actions taken by notation voting during the March, 1989.
2. Other priority matters which may come before the Board for which notice will be given at the earliest practicable time.

SUMMARY INFORMATION: Copies of the monthly report of the Board's notation voting actions will be available from the Executive Director's office following the meeting.

CONTACT PERSON FOR MORE INFORMATION: Mr. Charles R. Barnes, Executive Director, Tel: (202) 523–5920.

Date of Notice: March 15, 1989.

Charles R. Barnes,

Executive Director, National Mediation Board.

[FR Doc. 89–6853 Filed 3–20–89; 12:06 pm]

BILLING CODE 7550–01–M

Corrections

Federal Register
Vol. 54, No. 54
Wednesday, March 22, 1989

This section of the FEDERAL REGISTER contains editorial corrections of previously published Presidential, Rule, Proposed Rule, and Notice documents and volumes of the Code of Federal Regulations. These corrections are prepared by the Office of the Federal Register. Agency prepared corrections are issued as signed documents and appear in the appropriate document categories elsewhere in the issue.

DEPARTMENT OF HEALTH AND HUMAN SERVICES

Food and Drug Administration

21 CFR Part 5

Delegations of Authority and Organization; Center for Biologics Evaluation and Research and Center for Drug Evaluation and Research, et al.

Correction

In rule document 89-4516 beginning on page 8314 in the issue of Tuesday, February 28, 1989, make the following corrections:

§ 5.22 [Corrected]

1. On page 8315, in the third column, under § 5.22(a)(12)(iv), in the first line, "Division" should read "Divisions".

§ 5.50 [Corrected]

2. On page 8317, in the third column, in the heading of § 5.50, in the first line, "**OF**" should read "**TO**".

BILLING CODE 1505-01-D

DEPARTMENT OF HEALTH AND HUMAN SERVICES

Food and Drug Administration

21 CFR Part 341

[Docket No. 76N-052E]

Cold, Cough, Allergy, Bronchodilator, and Antiasthmatic Drug Products for Over-the-Counter Human Use; Expectorant Drug Products for Over-the-Counter Human Use; Final Monograph

Correction

In rule document 89-4517 beginning on page 8494 in the issue of Tuesday, February 28, 1989, make the following corrections:

1. On page 8495, in the third column, in the third complete paragraph, in the first line, "Guaifenesin" was misspelled.

2. On page 8499, in the first column, in the sixth line,"guaifenesin" was misspelled.

3. On page 8501, in the second column, in reference 22, in the third line, "Clearance" was misspelled.

4. On the same page, in the same column, in reference 26, in the first line, "Wojcicki" was misspelled.

5. On the same page, in the third column, in item 8, in the first line, "if" should read "of"; and in the second line "guaifenesin" was misspelled.

6. On page 8503, in the 2nd column, in the 10th line,"bronchitic" was misspelled.

7. On the same page, in the 3rd column, in item 9, in the 14th line,"judgment" was misspelled.

BILLING CODE 1505-01-D

DEPARTMENT OF THE TREASURY

Internal Revenue Service

26 CFR Part 1

[T.D. 8242]

Income Tax; Diversification Requirements for Variable Annuity,Endowment, and Life Insurance Contracts

Correction

In rule document 89-4867 beginning on page 8728 in the issue of Thursday, March 2, 1989, make the following correction:

§ 1.817-5 [Corrected]

1. On page 8730, in the 2nd column, in § 1.817-5(a)(1), in the 38th, 39th, and 40th lines remove the phrase "shall be treated as ordinary income received or accrued by the policyholder".

BILLING CODE 1505-01-D

DEPARTMENT OF THE TREASURY

Bureau of Alcohol, Tobacco, and Firearms

27 CFR Part 194

[T.D. ATF-271]

Occupational Taxes Relating to Alcohol, Tobacco, and Firearms

Correction

In rule document 88-10321 beginning on page 17538 in the issue of Tuesday, May 17, 1988, make the following correction:

§ 194.101 [Corrected]

1. On page 17552, in the second column, in § 194.101(a)(1), in the first entry of the listing, "$225.00" should read "$255.00".

BILLING CODE 1505-01-D

federal register

Wednesday
March 22, 1989

Part II

Environmental Protection Agency

40 CFR Part 80

Volatility Regulations for Gasoline and Alcohol Blends Sold in Calendar Years 1989 and Beyond; Final Rule

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 80

[AMS-FRL-3538-5]

Volatility Regulations for Gasoline and Alcohol Blends Sold in Calendar Years 1989 and Beyond

AGENCY: Environmental Protection Agency.

ACTION: Notice of final rulemaking.

SUMMARY: Today's action promulgates the Phase I of a two-phase reduction in summertime commercial gasoline volatility. Depending on the area of the country and the month, gasoline Reid Vapor Pressure (RVP) must be 10.5 pounds per square inch (psi), 9.5 psi, or 9.0 psi beginning in the summer of 1989.

This action will significantly reduce volatile organic compound (VOC) emissions from evaporating gasoline, which are a significant contributor to the nation's serious tropospheric ozone problem. This action is being taken at this time in order for its benefits to be available during the 1989 ozone season.

These regulations also provide an interim 1.0 psi RVP allowance for gasoline containing about 10 percent ethanol, but no such allowance for methanol blends. A final decision on how to regulate blend RVP will be included in regulations covering the second phase of RVP control. EPA expects to finalize this second phase of volatility reductions in the near future.

EFFECTIVE DATE: This regulation becomes effective on April 21, 1989.

ADDRESSES: Materials relevant to this rulemaking have been placed in Docket No. A-85-21 by EPA. Public Docket No. A-84-07, established in support of EPA's assessment of air pollution regulatory strategies for the gasoline marketing industry, also contains considerable background information and has been incorporated into A-85-21. The dockets are located at: Central Docket Section (A-130), U.S. Environmental Protection Agency, 401 M Street SW., Washington, DC 20460, in Room 4, South Conference Center and may be inspected between 8 a.m. and 4 p.m. Monday through Friday. A reasonable fee may be charged by EPA for copying docket materials.

FOR FURTHER INFORMATION CONTACT:

For information related to enforcement: Mr. Robert Kenney (EN-397F), Field Operations and Support Division, U.S. Environmental Protection Agency, 401 M Street SW., Washington, DC 20460, Telephone: (202) 382-2659

For other information: Mr. Tad Wysor, Standards Development and Support Branch, Emission Control Technology Division, U.S Environmental Protection Agency, 2565 Plymouth Road, Ann Arbor, MI 48105, Telephone: (313) 668-4332.

SUPPLEMENTARY INFORMATION:

I. Introduction

This preamble will: (1) Review the background for these actions; (2) describe the need for ozone control; (3) describe the action itself; (4) discuss enforcement issues; (5) discuss the costs and benefits of this program; and (6) summarize the comments received on the proposal relative to this action and EPA's response to them, plus more detailed analyses of comments received on the impact of volatility controls on the natural gas liquids and small refiners. Except where noted in this preamble, the analyses supporting these assessments are found in the Draft Regulatory Impact Analysis (DRIA) and the Final RIA (FRIA) which includes the summary and analysis of comments not addressed in this preamble. The DRIA was placed in the docket at the time of the proposal and the FRIA was placed in the docket at the time this final rule was signed.

II. Background

Gasoline volatility and evaporative emissions controls and onboard refueling controls were proposed in two Notices of Proposed Rulemaking (NPRMs) on August 19, 1987 (52 FR 31274, hereafter referred to as the "volatility" NPRM or proposal, and 52 FR 31162, hereafter referred to as the "refueling" NPRM or proposal, respectively). Descriptions of earlier events and actions leading up to these proposals may be found in those notices.

Since the proposals, several related events have occurred. On October 27-29, 1987, EPA held a public hearing on both the proposed volatility and refueling control programs and heard testimony from about 40 parties. The Agency accepted written comments until February 11, 1988, and received a large number and wide diversity of comments (see Public Participation section, below).

Certain concerns about industry design trends for evaporative and refueling control systems prompted EPA to hold a public workshop to highlight those concerns and present modifications to EPA's test procedures which would resolve these concerns. EPA may propose appropriate test procedure changes in a separate rulemaking in the future.

EPA will continue to assess whether additional control of gasoline volatility, beyond the regulations promulgated today, is cost-effective and reasonable. Any additional regulation will follow. Today's final rule achieves the reductions possible without the installation of capital equipment. Further reductions in gasoline volatility will require sufficient leadtime for equipment installation.

III. Environmental Need for Control

In both the volatility and refueling NPRMs EPA described the human health impact of exposure to high ozone concentrations and the widespread nature of non-attainment of the current National Ambient Air Quality Standard (NAAQS) for ozone. We also reviewed the evidence of ozone's effect on forests, crops, and materials.

EPA's level of concern with the ozone problem has not diminished; the increase in ozone violations during 1988 has reinforced the need to implement new controls on VOC emissions, including the controls introduced today. Preliminary 1988 ozone exceedance data indicate that there will probably be more areas in non-attainment during the three-year periods including 1988 than the three-year period of 1982-84, when 73 areas failed to achieve the ozone NAAQS.[1] It remains clear that EPA and the states need to pursue additional VOC control. Given this clear need for ozone control in the near term, and since ozone is a problem primarily in the summer months, this program is being promulgated now to achieve emission reductions this summer.

As discussed below, the program of gasoline volatility controls promulgated today is extremely cost effective in comparison to other ozone control programs being considered.

IV. Description of Today's Action

EPA today promulgates moderate summertime volatility controls to begin this summer, during the time when ozone nonattainment problems occur. This Phase I of EPA's 2-phase program requires reduction of gasoline volatility nationwide (except for Hawaii and Alaska) according to a system derived from the current month-by-month volatility class system developed by the American Society for Testing and Materials (ASTM).

The ASTM system, developed to result in similar vehicle driveability

[1] EPA memorandum, "The Effect of Vehicle Running Losses on Future Ozone Non-Attainment," from Don Clay, Acting Assistant Administrator, to The Administrator, October 6, 1988.

characteristics in different parts of the country, tends to also result in roughly similar evaporative emissions in each region. In the volatility NPRM, EPA proposed that, for May 16 through September 15, reductions of 8.7 percent (1989–91) and 21.7 percent (1992 and later) from the ASTM class A, B, and C maximum RVP levels of 9, 10, and 11.5 psi, respectively be enforced. However, a more detailed analysis of the geographic location of non-attainment areas, their temperatures, and of fuel distribution patterns has made it possible for EPA to "fine tune" the ASTM system for RVP control purposes for the summer months. Chapter 2 of the FRIA addresses comments on a number of aspects of the proposed control system and describes EPA's development of the system enacted in this action. Some of that analysis is summarized in the following paragraphs.

The EPA volatility system better focuses the emission reduction where and when it is most needed. Under this revised system many states or parts of states were reclassified to the level of control proposed for the next higher volatility ASTM class for at least part of the summer.

Based on the new EPA classification system, this first phase of EPA's 2-phase program requires gasoline RVP to be reduced from current levels to 10.5, 9.5, or 9.0 psi, depending on the area of the country and the month (see the final regulations published with this preamble for a month-by-month list of RVP standards for each state). These latter two RVP standards represent a somewhat less percent reduction than the corresponding standards proposed in the NPRM (9.1 and 8.2 psi, respectively). The 9.0 psi standard represents no reduction in volatility in ASTM Class A areas, which currently appear to be at or below 9.0 RVP on average. (However, the federally enforced standard will prevent degradation of volatility in the near term.) These changes from the proposal result from EPA's assessment that the proposed reduction from 10.0 to 9.1 RVP in Class B areas and reductions below 9.0 RVP in Class A areas could not be achieved by all refiners without sufficient leadtime for capital investment as described in the FRIA. Comments on this issue, and on the feasibility of 10.5 RVP in Class C areas, are consistent with this assessment (see Final RIA for details). Additional control in all areas will be considered as part of the final rulemaking for Phase II of EPA's volatility control.

The date on which enforcement of RVP standards begins each year depends on the point in the distribution system. Except for 1989, enforcement begins on June 1 for retail stations and other end-users of gasoline. Except for 1989, enforcement begins on May 1 for all other points in the distribution system, including refiners and importers, pipelines, and terminals. Enforcement ends at all points in the system including service stations on September 16. These requirements differ from those in the proposal, which required compliance at all points in the distribution system between May 16 and September 15. The reasons for the change are discussed below and in the FRIA.

For 1989, enforcement for end users begins on June 1 or 100 days after publication of these regulations, whichever occurs later. Enforcement at all other points in the system during 1989 begins on May 1 or 70 days after publication, whichever occurs later. This delay provision is due to the first-year leadtime considerations described below.

Such a two-date system for beginning the compliance period will achieve essentially the same emission reduction as the proposed single-date approach, while more appropriately focusing the efforts of refiners on terminal compliance rather than on low-volume service stations. As described in the FRIA, this compliance period should result in the equivalent of roughly five full months of emission reductions (high-volume service stations will come into compliance shortly after terminals) and will also incur refinery-level control costs for roughly five full months of production. (In 1989 the period of control will be slightly shorter because of the delay in the initial date of enforcement).

As mentioned above, we expect that this first phase of volatility control will not require investment in new refining equipment. Refiners will meet the reduced RVP primarily by not adding as much butane to gasoline and by varying refinery process operating conditions to substitute less volatile gasoline components to replace fuel volume and octane quality. EPA estimates that it will take approximately 70 days for refiners and terminals to comply with today's volatility standards. EPA has determined that it takes an average of 45 days to transport fuel to terminals and "mix down" tankage to the level of the standards (see Chapter 1 of the FRIA). The additional time provided here is available for refiners which may require additional start-up or distribution time. As described in Chapter 4 of the FRIA, refiners can begin production of this fuel with very little preparation time because no capital investments are required. EPA believes that the additional 30 days for the rest of the distribution chain provides more than enough time to meet the standards (for example, API commented that only 2 additional weeks should be required for compliance at service stations). Thus, EPA believes that 70 days is an adequate amount of leadtime for refiners and terminals and 100 days is adequate for the rest of the chain.

As discussed in detail in the FRIA, the existing ozone problem has not diminished, indeed, the increase in exceedances of the ozone NAAQS during 1988 has reinforced the need for further controls. Most ozone exceedances occur during the summer months. Thus, to implement this program for as much of the 1989 ozone season as possible, EPA is promulgating the volatility standards today.

A further aspect of this action is to provide an interim RVP allowance of 1.0 psi for ethanol blends of approximately 10 percent by volume, or "gasohol", but not for methanol blends. (The definition of blends meeting this criteria was outlined in the NPRM and remains the same for this interim program.) The gasohol allowance begins immediately with the introduction of this RVP control program. A final decision on such an allowance for all blends will be included in rules covering the second phase of RVP control. This issue is discussed further in section VII.D. below.

EPA expects gasoline refiners, etc., to meet the RVP standard levels in-use; that is, they will have to take the quality of and the variability in their testing into account in producing their product. Refiners can minimize this compliance margin, while still maintaining a high degree of confidence in compliance, by performing multiple tests on their product, ensuring that their test laboratory regularly correlates with EPA's enforcement testing laboratory and by ensuring that their test laboratory regularly runs samples of known RVP to validate their test apparatus. Refiners could also achieve the same degree of confidence in compliance by increasing their RVP compliance margin and not following the above procedure. Therefore, EPA expects gasoline RVP to be slightly lower than the standards in-use, but the degree of which will depend on which approach most refiners take.

V. Summary of the Enforcement Mechanism and Analysis of Comments Thereon

This section provides a Summary and Analysis of Comments on the

mechanism that the Agency will use to enforce the volatility regulations. A more detailed summary and analysis is included as an appendix to the FRIA.

This section includes a discussion of the overall enforcement mechanism, including the type of compliance monitoring program that will be used by EPA, the locations at which RVP standards will apply, and the types of activities prohibited by the regulations. It also addresses liability and defense provisions, sampling procedures, RVP testing procedures, alcohol content testing procedures, and other enforcement-related regulatory provisions.

A. Overall Enforcement Mechanism

1. Compliance Monitoring Program

After considering three mechanisms to monitor compliance with RVP controls (self-reporting, in-field sampling and testing, and a combination of the two), the Agency proposed an enforcement mechanism based on in-field sampling and testing. Today's final rule maintains in-field sampling and testing as the RVP enforcement mechanism.

The Agency received several comments on this issue. The majority of comments supported in-field sampling and testing as the best approach. A few comments favored an approach combining self-reporting for parties upstream (importers and refiners) and in-field sampling downstream. For the following reasons, EPA continues to believe that an in-field sampling and testing program is the most effective means to detect violations and to assure that the emission reduction benefits estimated for this control program are actually achieved.

The biggest disadvantage to self-reporting in the context of RVP regulation is the lack of any viable means to verify RVP test results; commenters were unable to provide EPA with any recommendations for an effective cross-check mechanism.

The principal argument made by the commenters in support of upstream self-reporting was that it would be less resource intensive than a monitoring system that would involve on-site inspections by EPA at refiner/importer facilities. However, EPA's experience with the lead phasedown program demonstrated that a self-reporting system would burden EPA with other resource intensive activities, including making difficult determinations of which parties should be reporting to EPA, processing large amounts of data, and correlating a self-reporting scheme with a standard which varies state by state and month by month. Furthermore, experience in the lead phasedown program has taught EPA that the inclusion of blenders who add RVP boosters in a self-reporting system would significantly increase EPA's workload and the number of violations because of these entities' unfamiliarity with regulatory programs. Finally, despite the fact that a cross-check mechanism did exist in lead phasedown, EPA has found that a substantial number of violations still go unreported.

In sum, EPA believes that a self-reporting RVP enforcement program would divert Agency resources to administrative and data processing activities with little environmental benefits.

2. Locations at Which Standard Applies

The proposed rule would have applied the RVP standard to gasoline (including alcohol-blend fuels) at all points in the distribution network at which they are sold, supplied, offered for sale or supply, or transported. These points include (but are not limited to): Refinery shipping tanks, importer shipping tanks, pipeline and other common carrier facilities, bulk terminals, bulk plants, service stations, and other facilities at which gasoline or alcohol-blend fuels are dispensed to motor vehicles. Today's final rule adopts this aspect of the proposal.

EPA received many comments on this issue. However, most comments addressed where EPA should concentrate enforcement as opposed to where the RVP standard should be applicable. A majority of comments supported focusing enforcement efforts upstream in the distribution system (refiners and importers) or upstream and midstream (especially at bulk terminals). A few comments supported concentrating enforcement only at midstream facilities. On the other hand, many comments supported enforcement at all points in the distribution network. Even those comments which favored concentrating enforcement upstream and/or midstream acknowledged that some type of monitoring, such as spot checks, would be necessary downstream.

EPA believes that imposing the RVP standard on all points in the distribution network is necessary to provide the best safeguard against illegal product reaching motorists, and will result in the greatest likelihood of achieving expected environmental benefits. Monitoring compliance upstream is desirable because there are fewer locations upstream, and each inspection will generally cover more product than at downstream facilities. More importantly, when violations are found upstream, the illegal product can be taken out of distribution early in the process before reaching consumers. Finally, to a great extent, parties upstream are already monitoring the RVP of gasoline they import or refine. Monitoring compliance downstream is also necessary because it is the only way that EPA can monitor the addition of RVP boosters during distribution after the gasoline leaves a refinery or importer facility.

EPA believes that applying this standard to all points in the distribution network will place the burden of compliance equally on all parties in a position to affect the RVP control of fuel, and will result in better quality control by everyone in the distribution chain. Moreover, if the standard is applicable to all points in the chain, EPA will have the greatest flexibility to target inspections where violations are most likely to occur and where their deterrent effect will be the greatest.

One commenter expressed concern about how EPA will classify product when conducting midstream and upstream inspections. Because the regulations apply the RVP standard upstream, the commenter feared that EPA could hold a party (*e.g.*, a refiner or importer) liable for the sale, offer for sale, supply or transport of product with RVP which exceeds the applicable standard even though the party intended that the product would be further blended before it would be sold as gasoline to motorists.

The commenter urged that EPA modify the proposal to ensure that blendstock will not be treated like finished gasoline. It suggested that EPA could avoid blendstock classification problems by providing that a party who sells, supplies, exchanges, or physically delivers product which it intends to be further blended before being sold as finished product will be subject to the RVP standards unless it obtains a certification from the buyer/receiver of the product. The certification would state that the buyer/receiver understands that the product may be non-conforming and that the buyer will not sell or supply the product as finished gasoline unless or until it is blended to meet RVP standards, or the buyer/receiver obtains an equivalent certification from a subsequent buyer.

With regard to classification of product, EPA has decided not to change the current definition of "gasoline" in the fuels regulations (40 CFR 80.2(c)), which defines this term as "any fuel sold in any State for use in motor vehicles and motor vehicle engines, and commonly or commercially known or sold as gasoline." However, in response

to the above commenter's concerns, as a matter of enforcement policy a party will not be held liable by the Agency for violating product which may arguably meet the regulatory definition of gasoline if the following requirements are met (which include the commenter's suggestion that a certification be obtained from the buyer/receiver of the product): (1) The product is clearly labeled as blendstock and the evidence supports this classification; (2) the label clearly states that the product may not comply with Federal RVP standards; (3) some aspect of the product's quality (other than the RVP) supports the party's claim that it intended the product to be further blended before being sold, supplied, etc., as finished product (*e.g.*, the octane is higher or lower than product typically sold as regular or premium grade gasoline)[2]; (4) the seller, supplier or transporter of the product has obtained a written certification from the buyer/recipient of the product that the buyer/recipient understands that the product may be non-conforming and that the buyer/recipient will not sell or supply the product as finished gasoline unless or until it is blended to meet federal RVP standards, or the buyer/receiver receives equivalent certification from a subsequent buyer; and (5) the party has no knowledge or reason to believe that the product will not be further blended to comply with the applicable RVP standard before being sold, supplied or transported as finished product.

When violations are found at a retail outlet or wholesale purchaser-consumer facility, the above-described defense will not be available. However, if an upstream party meets all of the above criteria, EPA may determine that such evidence supports a finding that the party did not cause the violation. The party would still be required to meet the other elements for a defense set forth in the regulations.

With regard to distributor/reseller liability for violations at retail outlets or wholesale purchaser-consumer facilities, if a distributor/reseller alleges that it sold or transferred the product as blendstock, and it meets the above five criteria, EPA may make a determination that the distributor/reseller did not cause the violation. The distributor/reseller would still be required to meet the other elements for a defense as set forth in the final regulations.

[2] Where the octane of product labeled blendstock is an intermediate level (*e.g.*, for unleaded gasoline between 87 and 91 octane), EPA will scrutinize the blendstock classification and transactions very closely.

The commenter also expressed concern that the regulations as proposed may subject refiners to liability for product which does not comply with Federal RVP standards despite the fact that the product is destined for export to a foreign country or is simply in storage.

Because gasoline is defined in existing § 80.2(c) of the regulations as "any fuel sold in any State * * *", gasoline which is exported is not covered by the volatility regulations. However, EPA will assume that all gasoline found in the United States is intended for domestic sale and thus subject to the RVP standards unless the product is clearly labeled as for export only, and the evidence supports this classification. The label should further clearly state that the product may not comply with Federal RVP standards. If such product enters the domestic market (*e.g.*, is on route to or at a distribution facility that is supplying fuel domestically, or at a retail outlet or a wholesale purchaser-consumer facility) and is found to exceed the applicable RVP standard, all parties will be presumed liable as set forth in the regulations. However, EPA will consider this evidence in determining whether a party caused the violation.

With regard to the storage of product, a refiner or importer will not be held liable for product which does not comply with the applicable RVP standard if it can show that the product is truly being stored and is not being sold, offered for sale, supplied, offered for supply, transported or dispensed. However, once gasoline leaves a refinery or importer facility, a party can no longer escape liability by claiming that the product was simply in storage. Although product may temporarily come to rest at some point after leaving a refinery or import facility, the intent of the regulations is to cover all gasoline being distributed in the marketplace. Once product leaves a refinery or importer facility it is in the marketplace and as such is in the process of being sold, supplied, offered for sale or supply, or transported.

Another related issue is how EPA will determine the applicable RVP standard for gasoline it samples and tests upstream from service stations. The regulations as proposed and promulgated define the applicable RVP standard as the RVP standard applicable to the geographic area and time period in which the gasoline is intended to be dispensed to motor vehicles. Where such area and time period cannot be determined the applicable standard will be assumed to be the most stringent RVP limit for that volatility season (i.e., the standard for Class A areas).

One commenter recommended that EPA' set forth in the regulations an affirmative obligation on parties upstream to label the product with the intended time and place of sale. EPA believes that it is not necessary to impose a labeling requirement on all parties. Those parties who wish to protect themselves can do so by clearly designating the intended time and place of sale. When conducting investigations, EPA will review any such designation, along with shipping documents (and any other documentation provided to EPA relevant parties) concerning where and when the party intended the product to be dispensed to motor vehicles. The burden will be on parties to provide clear evidence on this issue, or else the presumption of the most stringent standard will apply.

Several commenters who were opposed to downstream monitoring pointed out that when violations are found downstream, it will be more difficult to dispose of the product than when the violation is detected at a refiner/importer facility. EPA recognizes that remedying violations downstream will generally be more difficult than at a refinery or importer facility. However, EPA believes that this will be mitigated in part by EPA's compliance monitoring program upstream. The Agency anticipates that by applying the standard to upstream facilities, and conducting inspections upstream, there will be more quality control early in the distribution process, resulting in fewer violations at downstream facilities. For those violations that are detected downstream, there do exist methods for remedying the violations, which include pumping out product and sending it back to a terminal where it can be further blended to comply with the applicable RVP standard, or re-routing the product to a geographic area with a different RVP standard in which the product would be in compliance. In some cases, the product may be brought into compliance at the facility found to be in violation by the addition of a specified quantity of low RVP gasoline at that facility. While in some cases remedying the violation will be more difficult than in others, any remedial action taken by regulated parties will be taken into consideration by EPA in settlement negotiations for mitigation of the statutory penalty for the violation.

3. Prohibited Activities

The final rule also includes a minor clarification of the types of activities listed in § 80.27(a) that are subject to the

volatility regulations. The proposal provided that regulated parties may not "sell, offer for sale, supply, offer for supply, or transport" gasoline whose volatility exceeds the applicable standard. In today's final rule, the word "dispense" has been added to the list of regulated activities to make it clear that it is a violation for any of the listed parties to dispense gasoline with excessive volatility into motor vehicles. The proposed language was intended to fully cover the introduction of gasoline into motor vehicles. However, because the dispensing of gasoline was explicitly regulated in the Agency's unleaded fuels regulations (*e.g.*, 40 CFR 80.22(a)), EPA is including the word "dispense" in the final volatility regulations to make it clear that the volatility regulations prohibit this activity as well.

B. Liabilities and Defenses

1. Background

The proposed volatility liability provisions were patterned closely after the liability scheme used in the Agency's unleaded fuels regulations. In general, parties would be presumed liable for violations detected at their own facilities. Where violations are found midstream or downstream (i.e., at carrier, distributor, reseller, retailer, or wholesale purchaser-consumer facilities), vicarious liability would be presumed for certain parties upstream in the chain of distribution. Like the Agency's unleaded fuels regulations, where the facility is operating under the corporate, trade or brand name of a refiner, the refiner would be held vicariously liable for the violation. Common carriers would be presumed liable only for violations detected at their facilities. Where the violation is detected at a facility downstream from the carrier, the carrier would be liable only where it actually caused the violation. The proposed regulations set forth defenses for all parties who are presumptively or vicariously liable for RVP violations. The following paragraphs summarize what parties would be liable under the proposal for violations detected at each point in the distribution network.

For violations found at a refiner or importer facility, the refiner or importer would be exclusively liable.

If the violation is detected at a distributor or reseller facility, the distributor or reseller would be presumed liable. If the distributor or reseller operates under a refiner's corporate, trade or brand name, that refiner would also be held vicariously liable for the violation. If the distributor does not operate under a refiner's corporate, trade, or brand name, the actual refiner(s) or importer(s) of the gasoline would be presumed liable. Any carrier of the gasoline would also be liable if it caused the product to exceed the standard.

Carriers are presumed liable for violations detected at their facilities. In addition, the actual refiner(s) or importer(s) of the product found to be in violation would be presumed liable for the violation.

When violations are detected at retail outlets, the retailer and the distributor or reseller who sold the violating product to the retail outlet (i.e., the product contained in the retailer's underground storage tank) would be presumed liable for the violation. In addition, where the retail outlet is operating under a refiner's corporate, trade, or brand name, the refiner would be vicariously liable. Carriers would be liable for violations found at retail outlets only where they actually caused the violation.

Violations detected at wholesale purchaser-consumer (WPC) facilities would be treated in the same manner as violations detected at retail outlets.

In today's final rule, EPA is making two noteworthy changes affecting liabilities and defenses. First, EPA is modifying the defense available for distributors and resellers. The second change involves EPA's classification of ethanol blenders, who technically fit within the regulatory definition of refiner because they produce gasoline but whose production activity consists only of the addition of ethanol to a base gasoline. Aside from these and a few other minor changes discussed below, the remainder of the liability and defense sections in today's final rule are identical to the proposal.

2. Distributors and Resellers

When violations are found at retail outlets, the proposal would have imposed liability on distributors and resellers who supplied the violating product, and provided that the distributor or reseller would have a defense only where it could show: (1) The violation was not caused by the distributor/reseller, or its employees or agents; and (2) records with RVP test results showing that the product met the applicable standard when delivered to the retail outlet. The final rule modifies the proposed defense. Instead of requiring distributors/resellers to provide test results showing that the gasoline found to be in violation met the applicable standard, the distributor/reseller must (1) provide documentation from the party from whom the gasoline was received (or the party who produced or imported the product) which represented to the distributor/reseller that the gasoline was in compliance with the applicable standard when delivered to the distributor/reseller, and (2) demonstrate that it has an oversight program such as periodic sampling and testing of product. As in the proposal, the distributor/reseller must also show that it or its employees or agents did not cause the violation. These three elements for a defense are now listed at § 80.28(g)(3) and apply to violations detected at distributor/reseller facilities as well as to those found at retail outlets and wholesale purchaser-consumer facilities.[3]

This modification to the proposal has been made by the Agency in response to comments it received from petroleum marketers regarding liability for distributors/resellers. Several commenters were opposed to the requirement that distributors/resellers provide test results as part of the defense, arguing that testing each batch of gasoline would impose unreasonable costs and burdens on distributors/resellers and would slow down the distribution process. In lieu of a testing requirement these commenters recommended that distributors and resellers be afforded a defense where they are able to provide documentation from the refiner or importer representing to the distributor/reseller that the product was in compliance with the applicable standard at the time it was delivered to the distributor/reseller.

EPA continues to believe that a defense which requires distributors and resellers to provide test results showing that the gasoline found to be in violation met the RVP standard at the time it was delivered by the distributor/reseller to a retail facility would result in the most effective RVP quality control. However, the Agency also recognizes that such a testing requirement would impose new costs and additional burdens on distributors/resellers who have not been required to test each batch of delivered product under the Agency's unleaded fuels regulations. In addition, the

[3] Proposed § 80.28(g)(3) provided a defense only for violations detected at distributor/reseller facilities, while proposed § 80.28(g)(6) provided a defense for violations detected at retail outlets and WPC facilities. The final rule combines these defenses in one paragraph and makes them uniform. Because the distributor/reseller would already need to be periodically testing product to establish a defense for violations detected at retailer/wholesale purchaser-consumer facilities, this change should not create additional burdens for distributors and resellers. Overall, the promulgated defenses should be significantly less burdensome for distributors and resellers than the proposed defenses.

Agency recognizes that because of the current unavailability of a test procedure which yields quick and dependable results (i.e., a field screening test) a defense which requires that distributors test each batch of gasoline could result in distribution delays.

On the other hand, EPA believes that limiting the defense to documentation by the distributor/reseller showing that the product was in compliance when received by it would result in minimal quality control. The reliability of documents alone, without test results to support them, is questionable. Tests by the distributor/reseller of the product as it leaves the distributor/reseller facility are the only means to ensure that the RVP of the gasoline has not been altered during distribution. Without such test results it will be more difficult for the Agency to determine where the violation occurred.

Today's final rule imposes less stringent requirements on distributors/resellers than those in the proposal, but it is not as lenient as that called for by some commenters on the proposal. In addition to the paper certification advocated by such commenters, the final rule requires an oversight program which includes periodic testing of product. Such an oversight program will not cost nearly as much or be nearly as burdensome as testing each batch, but will provide significantly more quality control than paper certifications alone.

EPA's experience with enforcement of the unleaded fuels regulations indicates that requiring a regulated party to conduct an oversight program such as periodic sampling and testing of product is a workable approach. The Agency has deliberately used broad language in provisions establishing such a program as a defense in order to allow the party to determine what type of quality control (and what frequency of sampling and testing) is necessary under its specific circumstances. For example, if a party is aware that there is a higher rate of violations in a specific marketing region, or if the party suspects that a later party in the distribution network is somehow causing violations, the party should have a more vigorous oversight program in that region or with regard to that other party (or locations supplied by that party). Likewise, a party should have tighter quality control in areas where it believes violations would be more likely to occur. This approach will also allow the Agency the flexibility to respond to specific enforcement needs.

3. Ethanol Blenders

The other significant change in today's final rule involves the classification and treatment of ethanol blenders. Under the proposed regulations, which did not separately define blenders or give them special treatment, a person who blends gasoline components (such as alcohol) with finished gasoline and transports or stores the resulting product would be both a "refiner" and a "distributor" (as defined in § 80.2 (i) and (l), respectively). The blender would thus be subject to the liabilities and defenses for both of these types of parties. The Agency requested comments as to whether this treatment is appropriate.

The Agency received many comments on this issue. Several commenters argued that since alcohol blenders are like traditional refiners because they produce a new fuel, they should be held to the same liabilities and defenses as refiners. One commenter proposed that blenders be held to the liabilities and defenses of both distributors and refiners. Another commenter said that blenders should be subject to both distributor and refiner liabilities and defenses, and that where the liabilities and defenses are in conflict, they should be held to the more stringent.

The majority of comments were from ethanol blenders, all of whom were opposed to subjecting blenders to refiner liabilities and defenses. They pointed out that because blenders create a new fuel, to establish a defense under the proposal and to protect downstream parties from liability, blenders (like refiners) would have to test each batch of gasoline before delivering it to the next party. The commenters claimed that testing each batch would be so costly and administratively burdensome that alcohol blenders would be forced out of the market.

The commenters explained that 95 percent of ethanol blending is done at terminals in tank trucks. To ensure a defense blenders would have to test each blend in each truck, which would mean testing each grade of gasoline in each truck compartment. Because each truck only carries a few thousand gallons, the cost per gallon to test each batch would far exceed the cost of testing for refiners because each test by a refiner would generally cover a much greater volume of gasoline. Moreover, the commenters argued that the sampling process would require special training and skills which are hardly within the range of a tank truck driver. Finally, because no field test currently exists, samples would have to be sent to a laboratory for test results. The truck driver would then have to wait for the lab test to come back before he could deliver the gasoline to a retail outlet.

As an alternative to EPA's proposal, the commenters proposed the following treatment for ethanol blenders. Because 10 percent ethanol when added to a base gasoline increases its RVP by about 1.0 psi, instead of testing each batch of alcohol blend, blenders could obtain a certification from the manufacturer of the base gasoline showing that such fuel meets the applicable RVP standard. In addition, the blender could certify that the proper amount of ethanol (10 percent) was added to the base gasoline. In addition to establishing a defense for the ethanol blender, these certifications could also be transferred to the buyers of the blend, assisting them in their defense. One commenter added that EPA could also require that blenders conduct random spot testing of outgoing product.

In response to the comments it received on this issue, in today's final rule EPA is modifying the proposal and providing a separate defense for ethanol blenders. To accomplish this, EPA is adding two new definitions to the Part 80 fuels regulations. The first new definition, at § 80.2(u), defines an "ethanol blending plant" as a refinery at which gasoline is produced solely through the addition of ethanol to a base gasoline without altering its quality or quantity in any other manner. An "ethanol blender" is defined at § 80.2(v) as any person who owns, leases, operates, controls or supervises an ethanol blending plant. These regulatory definitions carve out a special subcategory of refiner for persons who produce gasoline solely through the addition of ethanol and a special subcategory of refinery for facilities at which such production takes place.

Persons who fall within the definition of ethanol blender will then be treated separately under the liability sections. Sections 80.28 (c) and (d) now include ethanol blending plants as facilities at which violations may be detected. The liability provisions also explicitly list the ethanol blender (if any) as a party that would be presumed liable when violations are found at a distributor/reseller facility, an ethanol blending plant, a carrier facility, a retail outlet, or a wholesale purchaser-consumer facility. More importantly, the defense provisions now set forth a special defense for ethanol blenders at § 80.28(g)(6).

The defense for ethanol blenders in large part tracks the defense for distributors and resellers, and incorporates the recommendations made by ethanol blenders. To establish a defense, an ethanol blender (like distributors and resellers) will have to: (1) Demonstrate that the violation was not caused by him or his employee or

agent; (2) provide documentation from the refiner at whose refinery the base gasoline was produced, the importer at whose facility the base gasoline was imported, or the carrier, reseller or distributor from whom the base gasoline was received representing to the blender that the base gasoline met the applicable RVP standard; and (3) demonstrate that it has a quality control program such as periodic sampling and testing of product that it sells, supplies, offers for sale or supply, or transports. In addition, the blender must certify that no more than 10 percent ethanol (by volume) was added to the base gasoline.

Because most ethanol blending is done in tank trucks, EPA recognizes that testing each new blend to establish a defense would be more costly and administratively burdensome for ethanol blenders than for other refiners, who generally produce gasoline in larger volumes and have more sophisticated operations. The Agency is less convinced by the argument that if a blender adds only ethanol, and the base gasoline has already been tested and certified as meeting the appropriate RVP standard, there is less of a need from a quality control standpoint to test the new blend. Because ethanol blenders are refiners who do in fact create a new fuel and who may not have existing sophisticated quality control programs, EPA believes that paper certifications (of the type called for by commenters) alone are insufficient. The Agency is also requiring a quality control program, with periodic testing of product, because it will provide some assurance that the base gasoline did in fact meet the RVP standard, that the proper amount of ethanol was added and that the product was not altered in any other way. A periodic testing program will therefore provide better and more reliable quality control than paper certifications alone, but will cost less and not be as burdensome on blenders as testing each batch.

The defenses described above apply during the time period in which the "first-step" RVP standards (with their interim 1.0 psi additional allowance for ethanol blenders) are in effect. The Agency is considering limiting this special treatment for ethanol blenders to low volume blenders in its second-step volatility rulemaking (if the 1.0 psi allowance is continued in that rulemaking). This change is being considered because it appears (from reports submitted under the lead phasedown program) that a few blenders are significantly larger than the rest and would appear to have the capabilities of refiners.

Under the promulgated regulatory definitions, there may still be cases in which a potentially liable party meets both the definition of "ethanol blender" and that of another regulated party. For example, a party may be both an ethanol blender because of its blending activities and a distributor because of its transportation of the blended product to a retail outlet. Under certain circumstances, an ethanol blender could also be a reseller or a branded refiner. In such cases, where a party may be liable for a specific violation as both an ethanol blender and another type of regulated party, the Agency will require that the party meet only the defense provided for an ethanol blender in order to rebut the presumption of liability. Such a party would, therefore, have to meet the defense specified in § 80.28(g)(6) rather than the defense provided for the other type of party (e.g., distributor/reseller defense in § 80.28(g)(3); branded refiner defense in § 80.28(g)(4)).

4. Other Regulatory Changes

EPA is making three other minor changes regarding the defenses.

First, to make out a defense both the proposal and today's final rule provide that regulated parties who are found presumptively liable must generally show that they or their employees or agents did not cause the violation (most parties must also meet other elements of a defense). For refiners, the proposal provided that refiners can demonstrate that the violation was caused or must have been caused by another party by means of "reasonably specific showings, by direct or circumstantial evidence." This provision has been promulgated as proposed. See 40 CFR § 80.28(g)(4)(iv). In an effort to make this language regarding causation consistent throughout the regulations, in § 80.28(g)(7) of the final rule EPA is also providing this same treatment to all parties who must show that they did not cause a violation.

Second, EPA is adding clarifying language to the carrier defense (§ 80.28(g)(1)(i)). The proposal required that for a defense carriers must demonstrate (in part) that they have documents from the refiner or importer at whose refinery or import facility the gasoline was produced or imported which represented to the carrier that the gasoline was in compliance with the applicable standard when delivered to the carrier. The final rule provides that such documents may also be received by the carrier from the (other) carrier, reseller, or distributor from whom the gasoline was received. This change is being made because in practice carriers often receive products from other carriers, resellers, or distributors. It also makes the carrier defense language consistent with the distributor defense language at § 80.28(g)(3)(ii).

Finally, EPA is making certain minor revisions to the proposed refiner defense language. Section 80.28(g)(4)(iii)(B)–(D) provides that to establish one element of a defense a refiner must in certain cases show that it had a contractual agreement with the party who actually caused the violation, and that such agreement was designed to prevent such a violation by that party and that the refiner made reasonable efforts (such as periodic sampling) to insure compliance by that party with the contractual obligation. EPA has revised the phrase "such as periodic sampling" to read "such as periodic sampling and testing" to clarify EPA's intent that a periodic sampling program includes testing the product as well. This revision makes this portion of these provisions consistent with the language proposed and finalized for the carrier defense in § 80.28(g)(1)(ii) and the distributor defense promulgated in today's final rule at § 80.28(g)(3).

In addition, EPA has included references to ethanol blenders at appropriate places in §80.28(g)(4)(iii)(B), (D), (E), and (F). The main purpose of these changes is to provide an additional defense to branded refiners for violations caused by the actions of such blenders. To escape liability in such cases, branded refiners would have to establish the same defense as for violations caused by resellers and distributors. Other changes to these provisions reflect the fact that an ethanol blender may be the recipient of gasoline from a terminal.

5. Carriers

The Agency received several comments regarding presumptive liability for carriers. The proposal provided that carriers would be presumed liable for violations detected at their facilities. To rebut this presumption, carriers would have to provide documents from the refiner or importer at whose refinery or import facility the gasoline was produced or imported which represented to the carrier that the gasoline was in compliance with the applicable RVP standard when delivered to the carrier. In addition, the carrier would have to demonstrate that it had an oversight program, such as periodic sampling and testing of product that it carries, which shows that the carrier is attempting to ensure that the product which it carries meets the applicable RVP standards.

Finally, the proposal provided that the carrier would have to show that it or its employees or agents did not cause the violation. For violations detected at facilities downstream from the carrier, the proposal would have held a carrier liable only when the carrier actually caused the violation.

The trucking industry, along with several refiners, opposed presumptive liability for carriers for violations at carrier facilities, and felt that carriers should only be liable when they actually caused the violation. The commenters argued that testing imposes costs and burdens on carriers who do not have title to the product, and have no incentive to purposefully alter it. One commenter argued that the taking of samples is unsafe, and could also be viewed as an unlawful conversion since the carrier does not own the product. Another commenter felt that such parties should only be liable if they are unable to provide EPA with the name of the shipper whose product they are transporting.

On the other hand, a state environmental agency that has experience enforcing volatility regulations, supported presumptive liability for carriers as proposed. The state agency argued that carriers should only be afforded a defense if they provide EPA with test results showing that the gasoline found to be in violation met the RVP standard when the carrier delivered it to the next party.

The Agency is promulgating the liability provisions for carriers as proposed because it believes that presumptive liability, with the defenses as proposed, will provide some degree of RVP quality control without imposing unreasonable costs and burdens on carriers. EPA has learned through its experience with the unleaded fuels regulations that it is very difficult to enforce regulations which do not include a presumption that a party is liable for a violation. The Agency has also found that parties who are presumed liable are generally more willing to cooperate and provide it with information it needs to complete its investigation, resulting in a better ability by EPA to locate and penalize the party who actually caused the violation.

Even assuming that a carrier who does not have title to the product has less incentive to alter the quality of the gasoline than the party who owns it, the carrier's handling of the product can nevertheless result in violations. For example, batches of gasoline with different RVP levels can be inadvertently or negligently commingled in storage tanks at a pipeline facility. Also, product that was intended to be delivered to one RVP area (e.g., an area with a Class C standard) may be intentionally or negligently re-routed by the carrier to another RVP area (e.g., an area with a Class B standard). This re-routing of the gasoline could result in the gasoline not complying with the applicable standard for that area.

Finally, EPA believes that the inclusion of an oversight program as part of the defense is preferable to providing a defense where carriers need only submit documents from the shipper who hired them certifying that the product met RVP standards. Because a quality control program does not necessitate testing each batch of gasoline, but envisions a program such as periodic testing, the final rule will not impose extraordinary expenses and burdens on the carrier. EPA believes that the quality control that would be gained from an oversight program would significantly outweigh the additional expense that such a program would entail and justifies any precautions a carrier would need to follow should it choose to protect itself from liability with a periodic testing and sampling program. (Other concerns of commenters regarding carrier liability are addressed in the final RIA).

C. Sampling Methodologies

A sampling methodology prescribes the procedures that must be followed to obtain a valid sample for performance of an RVP test. A sampling methodology is necessary to assure that a sample's volatility is representative of the whole product being sampled. Such a methodology should also provide a clear standard for enforcement purposes, alleviating disputes that may result when there is no methodology or an ambiguous methodology. Industry quality control efforts are assisted by providing notice of the sampling methodology that will be followed by the Agency in its RVP enforcement program.

The sampling methodology proposed in the NPRM set forth at 40 CFR Part 80 Appendix D was essentially identical to that used by the California Air Resources Board (Cal. Admin. Code Tit. 13, R. 2261). CARB's methodology is a combination of the ASTM sampling methodologies for gasoline products and a service station nozzle sampling procedure developed by CARB.

The proposed ASTM methodologies would be used by the Agency in sampling gasoline and alcohol blend fuels at facilities such as refineries, import facilities, blending facilities, pipelines, bulk terminals, and bulk plants. These sampling procedures include bottle sampling, tap sampling, and manual line sampling. The proposed nozzle sampling procedure would be used at service stations and similar dispensing facilities (e.g., fleets).

In the NPRM (52 FR 31309) specific issues were raised by EPA on which comments were requested. The following is a summary of changes made in the final rule due to comments received on, and EPA's further analysis of, these issues. Except as discussed below, the sampling methodologies in 40 CFR Part 80 Appendix D are being promulgated as proposed.

(1) The Agency stated that it was considering an alternative nozzle sampling technique in which, instead of placing the sample container in a chilling medium while being filled and stored (as in the CARB procedures), the container would remain at ambient temperatures prior to pre-testing cooling. This alternative was considered because during its evaluation of the different nozzle sampling techniques EPA took samples with and without chilling and found no difference in RVP measurements. An oil company commented that proper sampling procedures and appropriate container selection are more important in obtaining accurate RVP results than chilling the sample. An auto company commented that it does not chill the sample or container at the point of sampling. Based on these comments and its own study on this issue, EPA is promulgating the final rule without the chilling requirement.

(2) As another alternative nozzle sampling technique, the Agency stated that it was considering use of an EPA-developed technique described in the NPRM (52 FR 31298, col. 1) instead of the CARB nozzle sampling procedure. The same auto company recommended use of the CARB nozzle sampling methodology because it is widely used and accepted. In addition, the auto company stated that the EPA-developed technique does not appear workable to evaluate a large number of service stations. An oil company recommended that EPA utilize only ASTM-approved procedures for purposes of sampling to determine compliance under these regulations. Although testing conducted by EPA on samples taken using the CARB sampling technique and the EPA-developed technique showed essentially the same results, based on the comments received EPA has decided at this time not to use the EPA-developed technique for nozzle sampling. Instead, the Agency is promulgating the CARB nozzle sampling procedure which has been extensively used and shown to be effective in California's RVP control

program. ASTM has not adopted a procedure that can be used effectively at service stations and the Agency believes compliance monitoring at such facilities is too important to await such development when a proven technique is already available.

(3) The Agency asked for comments on whether a more simplified procedure could be developed for the ASTM and CARB sampling methodologies since they are complex and detailed. An auto company stated that ASTM test methods should be used. Any proposed changes by EPA may reduce the confidence level of resulting test data because the methodology has not been properly statistically validated. An oil industry trade association, noting a potential conflict between the proposal and ASTM D–4057, recommended that the regulation "specify only the sampling techniques permitted (e.g., tap sampling, bottle spot sampling, running sample, etc.) and references to the procedures in ASTM D–4057 or other applicable industry standards. In instances where a sampling procedure is not covered by an industry standard, a description of the sampling procedure is appropriate in the regulation." Another auto company stated simplification could be accomplished by eliminating the sample cooling techniques.

The recommendation that sample cooling be eliminated has been accepted for nozzle and tap sampling procedures, as set forth in sections (1) and (6). In addition, proposed sections 12.2 and 12.7 have been eliminated from the final rules because they dealt with cooling baths and procedures. Also, promulgated § 12.5 (proposed § 12.6) has been revised to eliminate the use of open containers to sample a closed tank since a cooling bath procedure is apparently needed to use such containers and the final rules have eliminated the use of all cooling procedures during sampling. The proposed rules did not include any other sample cooling requirements (except as part of the RVP test procedures).

Because the other comments received did not identify specific ways in which to simplify the sampling methodologies, EPA is not able at this time to simplify the NPRM sampling metholodologies in the final rule. However, the Agency continues to be interested in this area and will review any future suggestions from interested parties. EPA is not incorporating by reference industry standards because it cannot delegate rulemaking authority to private groups and because it is making changes to current ASTM procedures.

(4) In a study conducted by EPA, the volatilities of refrigerated and non-refrigerated samples were found to not be significantly different from one another over the total storage period of almost two months. Based on this study, the Agency asked in the NPRM whether refrigeration of samples should be required. An oil company stated that samples can be stored at unrefrigerated temperatures provided that the containers are tightly sealed. An auto company stated that it has not conducted tests in this area. Based on the comments received and the above-noted study on this issue, EPA has determined that refrigeration is not mandatory but that special care should be taken to insure that the caps on sample containers are tightly sealed.

(5) The Agency has conducted some testing on the issue of what volume of fuel should be purged from a fuel dispenser prior to the taking of a sample. Results indicated no difference between samples taken without any purge volume and samples taken with a three gallon purge volume. In the NPRM EPA asked for comments on how much purge volume is necessary. An auto company stated that purging prior to sampling is required. This commenter questioned whether a three gallon purge is sufficient, but has no data at this time to substantiate what purge quantity is required and recommends further testing. Another auto company stated that purging is necessary unless fuel has been delivered through the system for a period of time, it is at moderate temperature, and is not vented. Based on the comments received, and its own analysis, EPA has determined that some amount of purging is needed before nozzle sampling is done. However, EPA's testing indicates that no specific amount of purge volume is required. Therefore, the Agency will require sampling to be conducted from a nozzle after a vehicle has just received some quantity of gasoline. This is the same practice used by CARB and it should in most cases result in at least a 3-gallon purge. The inspector will record the number of gallons dispensed from the nozzle immediately before sampling.

(6) The Agency stated in the NPRM that it was considering the elimination of a cooling bath for tap sampling. Instead the sample container could be chilled during sampling by placing it in an ice chest, as proposed for samples collected by the nozzle sampling procedure. Comments were requested on whether any cooling of a sample (via cooling bath or ice chest) obtained by tap sampling is necessary.

CARB commented that it has data which shows that sampling without cooling does not make a measureable difference in RVP results when compared with sampling using a cooling system. An oil company also stated that no chilling is needed to obtain a sample by the tap sampling method. Based on these comments, comments received on issue (1) above, and on testing EPA has conducted which showed slight differences in RVP readings between samples which were and were not chilled, EPA is promulgating the final rule without any chilling requirement for tap sampling.

(7) The Agency stated in the NPRM that it was considering increasing the maximum amount of fuel to be sampled to 90 percent of the sample container. This would be a change from a maximum of 85 percent specified in ASTM D–4057. One oil company suggested that the sample container fill level not be changed to a 90 percent maximum. One auto company had no objection to raising the maximum fill level from 85 percent to 90 percent. However, another auto company stated that the volume of the sample in the container when the sample is taken is not critical as long as it is over 70 percent full. If the sample is over 80 percent full after chilling, the excess over 80 percent must be removed and the sample shaken to properly aerate the fuel before the test. Laboratory experience has shown that if the container is less than 70 percent or more than 80 percent full, volatility data may be significantly affected. If containers are filled to 90 percent as EPA suggests, this commenter recommended that after chilling the excess over 75 percent should be removed.

Based on the comments received, EPA is promulgating the final rule without changing the maximum fill level to 90 percent. Such a change is not needed for an effective sampling program and legitimate concerns have been raised about its impact.

D. Testing Methodologies

A testing methodology is needed for the measurement of gasoline and gasoline-alcohol blend RVP levels to ensure that a standard technique is used for enforcement of the volatility regulations. In addition, a testing methodology for alcohol content in gasoline-alcohol blends is needed since the Agency is promulgating a different RVP standard for such blends which contain certain amounts of ethanol.[4]

[4] The alcohol testing methodologies being promulgated today will also apply to determinations of methanol content should a different RVP standard for blends containing this type of alcohol be prescribed by the Agency as part of the "second-step" RVP standards.

Industry quality control efforts are assisted by providing notice of the testing methodologies that will be followed by the Agency in its RVP enforcement program.

1. Volatility

Two RVP testing methodologies were proposed in the NPRM. Proposed Method 1 is almost identical to the proposed ASTM P-176 test method, which is a dry version of the existing ASTM D-323 RVP test method.[5] In Method 1 the gasoline chamber of the vapor pressure apparatus is filled with a chilled sample and connected to the air chamber at 100 °F. The apparatus is immersed in a bath at 100 °F and is manually shaken periodically until a constant pressure is observed on the gauge attached to the apparatus. The gauge reading, suitably corrected, is reported as the RVP of the sample.

Proposed RVP test Method 2 uses the Herzog testing equipment and is patterned after Method 1. The difference is that the sample bomb (the container holding the sample) is automatically rotated to provide controlled and consistent mixing of the bomb. This procedure also uses a bath temperature of 100 °F and has other similarities to the "dry" P-176 ASTM method.

In the NPRM (52 FR 31309-10) specific issues were raised by EPA on which comments were requested. Except as discussed below, the volatility methodologies in 40 CFR Part 80 Appendix E are being promulgated as proposed.

1. Enforcement tolerance. The Agency asked for comments on what enforcement tolerance(s) should be allowed in the enforcement of this regulation. The NPRM stated that a range of enforcement tolerances (based on RVP test reproducibility values) could be used by the Agency. Comments were received from oil companies and auto manufacturers recommending tolerances ranging from 0.55 psi to 1.33 psi.

On this issue, as stated in section IV of this notice, above, EPA has determined that gasoline refiners and other regulated parties will be expected to meet applicable RVP standards in-use. In other words, they must take test variability into account in producing (and marketing) gasoline and cannot rely on the Agency to automatically provide an enforcement tolerance in addition to the RVP standard. For example, if the applicable RVP standard is 10.5 psi and the Agency finds a sample of gasoline to exceed this standard (e.g., 10.6 psi), this will be considered a violation of the regulatory standard that could subject liable parties to an enforcement action. This is the same manner in which the Agency's motor vehicle emission control standards are enforced.

EPA's experience in its RVP testing program has been that consistent results can be obtained with careful testing procedures. In its analysis of RVP test results, the Agency has found that the repeatability of testing conducted with the dry Herzog method is approximately 0.30 psi. EPA expects future precision to be as good as, or better than, this value. In order to ensure quality results, the Agency lab conducts daily RVP tests of "pure" components with known RVP values (e.g., cyclopentane).

The final regulations provide a partial defense to certain parties who can demonstrate test results evidencing that gasoline found to be in violation was in compliance with the applicable RVP standard when it left that party's hands. See, for example, 40 CFR 80.28(g)(4)(i). In administering this provision, the Agency will look at the quality of a party's testing program to determine how much weight will be given to test results in a particular case. For example, EPA will place a higher value on test results if: (1) multiple samples (rather than a single sample) have been taken from a batch and tested; (2) the party's laboratory has run correlation tests with EPA's laboratory, an independent laboratory, or a national exchange program; and/or (3) a party's testing program includes regular verification using a component of known RVP.

2. The Agency asked for comments on whether to adopt the Southwest Research Institute (SRI) automatic method as an additional RVP testing methodology. One oil company commented that EPA should consider the SRI automatic RVP analyzer once it is published as an ASTM standard. Another oil company supported the adoption of ASTM P-176, which includes the SRI method.

EPA has determined that since the SRI method has not been formally adopted by ASTM or fully evaluated by EPA, this method will not be adopted at this time as an additional RVP testing method. For similar reasons, the Agency is not promulgating any RVP test methods other than those proposed as Methods 1 and 2. If additional methods are developed after the final rule publication and demonstrated to be as accurate and effective as those being promulgated, the Agency intends to promptly publish an NPRM requesting comments on the test method and to promulgate the method as an official test procedure, if feasible.

3. The Agency also asked for comments on the following modifications to Method 1. EPA's decision on the appropriateness of making each modification is included below.

a. In section 6.4.5, the Agency considered specifying the time in which the sample is cooled to 32-34 °F to insure that the vapor in the container has been cooled. The Agency requested submittal of any test data available on this issue. One auto company supported specifying a time to reach 32-34 °F and recommended that samples remain at this level for a minimum of 8 hours. Another auto company stated that it leaves fuel samples in refrigeration for at least 2 hours before running volatility tests. Because neither of the comments submitted provided any test data to show a need to cool a sample for a specified period of time, the final rule will not require a specific amount of time to cool the sample. Rather, the procedure specified in the NPRM, which is used by both ASTM and CARB, will be included in the final rules. This procedure is to directly measure the temperature of a similar liquid at a similar initial temperature in a like container placed in the cooling bath at the same time as the sample. The Agency believes that this procedure is adequate to assure that sufficient cooling has taken place.

b. Concerning section 7.3, EPA asked for comments on eliminating the option of putting the fuel chamber into an ice bath for cooling, and instead requiring that the cooling be done in a refrigerator. One auto company supported the use of refrigeration in place of the ice bath for cooling. Another reported that it no longer chills fuel chambers due to the number of samples being analyzed. The Agency has determined that it will not make it mandatory to cool the fuel chamber in a refrigerator because the practice of using either an ice bath or a refrigerator has been used successfully in the past and because no comments were received to indicate that a difference in test results occurs when using one particular cooling method versus the other.

c. In section 7.4, the Agency suggested changing the time that the air chamber is immersed in the water bath from 20 minutes to 10 minutes. Proposed Method 2 included a 10 minute immersion time. One auto company concurred with this suggestion as long as there is adequate stirring in the waterbath. Another commented that if 10 minutes is long

[5] This method has subsequently been adopted by ASTM as Annex A 2 of the D-4814 test method.

enough to get both the air in the air chamber and the air chamber itself to the proper temperature, then it is acceptable to make the change, but that this would have to be demonstrated with comparative tests.

The Agency has found that in doing testing with the Herzog equipment a stable pressure is reached in about five minutes. Therefore, the Agency believes that having the air chamber immersed for 10 minutes in Method 2 will not adversely affect test results, and this test element is being finalized as proposed. However, no data exists to show that results will not be adversely affected if the time is changed from 20 minutes to 10 minutes in Method 1. Therefore, in Method 1 the time will remain 20 minutes.

d. In section 8.2, the Agency proposed to allow 30 seconds for assembly of the apparatus instead of the 10 second ASTM requirement and asked for comments on this change. An auto manufacturer opposed an increase to 30 seconds because it believes such an increase may affect accuracy. Another reported that the longer the delay for assembly of the apparatus, the greater the chance that the apparatus will not be at the proper temperature. Therefore, this commenter said that EPA should comply with industry practice. CARB recommended that the 10 second ASTM requirement be used by EPA.

Based on the comments received and additional investigation by the Agency, EPA has decided to use the 10 second requirement specified by ASTM. The final regulations reflect this change. In addition, proposed section 8.2 appeared in Method 2 with a slight difference in terminology from the same section in Method 1. Because there was no significant difference between the two provisions, for the sake of uniformity the language of proposed Method 1 is now included in the final version of both methods.

e. Concerning section 8.5, comments were requested on using hot water and acetone to rinse the apparatus, and of drying the apparatus either by blowing dried air or by pulling a vacuum. An auto manufacturer believes that current practices with rinsing solutions are proper. In particular, this commenter believes that acetone must not be used because it will affect the RVP value. Another manufacturer indicated that how the apparatus is cleaned is not important as long as it is as clean as it would be after using the original method. The Agency notes that the current ASTM practice uses acetone and that the method discussed in the NPRM has been used successfully in EPA testing. Therefore, EPA believes that this method will prepare the testing apparatus adequately for the next test and is including it in the final rule. Sections 8.5 of Methods 1 and 2 have been revised to include both the blowing of dried air and the pulling of a vacuum as proper means to dry the testing apparatus (the proposal erroneously included only one of these means in each method).

f. Comments were requested on the need for gauges and transducers to be calibrated against a dead weight tester or mercury manometer and whether, when using the mercury manometer, the temperature corrected density should be used. An auto manufacturer recommended using a mercury manometer to calibrate gauges. The same manufacturer indicated that if EPA uses calibration charts equating gauge pressures in psi to millimeters of mercury, it will circumvent the need to make a temperature correction on the mercury density. Another auto manufacturer commented that the density changes of mercury for normal ambient temperature changes would not significantly change the pressure measurements of the mercury manometer. The Agency believes that good laboratory practice should be used in calibrating the gauges. Thus, there is not a specific requirement in the final rule on how to calibrate the test equipment.

2. Alcohol

Three alcohol content laboratory testing methods were proposed in the NPRM. Under proposed Method 1, gasoline samples are extracted with water prior to analysis on a gas chromatograph (GC). The extraction eliminates hydrocarbon interference during chromatography. A known quantity of isopropanol is added to the fuel prior to extraction to act as an internal standard. Results are calculated and reported by data reduction software in the GC using peak area, retention times and other data obtained during the run.

Proposed Method 2 is a direct GC injection technique utilizing a single column (30 to 60 meter length) which is capable of resolving the individual alcohols without interference from hydrocarbon fuel components. Little sample handling is necessary, resulting in potentially more accurate results. The NPRM stated that this method would be similar to that proposed in ASTM P-176 Appendix XII.

Proposed Method 3 is a two-column backflush GC method in which the sample is injected and loaded onto a primary column. This column retains the alcohols but does not retain the lighter weight hydrocarbon fractions of the fuel. After the lighter fractions are rinsed out of the primary column, the carrier gas flow through the column is reversed, the alcohols and heavier hydrocarbon fractions are loaded onto a secondary column and are individually separated for analysis. The NPRM stated that this method would be similar to that proposed in ASTM P-176 Appendix X9.

Comments on the proposed alcohol test methods include the following. An auto manufacturer stated that the proposed alcohol test procedures may be used to determine compliance as long as it is understood that the reproducibility limits would be the limits allowed to determine compliance. Another auto manufacturer supports proposed Methods 2 and 3 but believes that Method 1 is the least accurate of the three methods and should not be adopted. CARB commented that if EPA uses a GC then CARB would accept it.

Appendix F of the final rules contains two methods for the analysis of alcohol content. Promulgated Method 1 is identical to proposed Method 1. Promulgated Method 2 is similar to proposed Method 3. Promulgated Method 2 is almost identical to the recently adopted ASTM D-4815.[6] Proposed Method 3 was based on proposed ASTM P-176 Appendix X9, from which ASTM D-4815 was developed. Both ASTM D-4815 and ASTM P-176 Appendix X9 are two column back flush methods which use a GC for analysis of the alcohol content of a sample. Although there are certain differences between the proposed and adopted ASTM procedures, the changes made in the adopted procedures are mainly refinements of the proposal. Changes in ASTM D-4815 include: (1) Allowance of a flame ionization detector (FID) as well as the thermal conductivity detector (TCD) included in ASTM P-176 (FIDs are generally more available, more economical, and more sensitive than TCDs); (2) use of an internal standard, a well accepted means of controlling variances in results due to differences in technique; and (3) allowance for the use of other columns in addition to the packed, stainless steel columns described in ASTM P-176. The Agency believes that the changes made by ASTM and in today's final rule will result in a more effective test procedure

[6] The only significant change made by the Agency to ASTM D-4815 is inclusion of a requirement in sections 1.2 and 14.2 that samples found to contain more than 10% alcohol should be diluted to less than that concentration and retested. Other changes include deletion of certain footnotes, substitution of a cross-reference to the EPA sampling procedures, and correction of typographical errors.

that can be conducted on a more widely available range of instruments.

Proposed Method 2 (a single column method) is not being promulgated. This method was modeled after ASTM P-176, Appendix X11, which has been abandoned by ASTM. This method will not be promulgated because no data is available to support its use. Additionally, it is not needed at this time because two other methods are being finalized in this notice.

The Agency is aware that there may be other methods for alcohol content analysis that use a GC and a single or dual column method. If additional methods are developed after final rule publication and demonstrated to be as accurate and effective as those being promulgated, the Agency intends to promptly publish an NPRM requesting comments on such methods, and to promulgate the methods as official test procedures if feasible.

E. Other Regulatory Provisions

The volatility NPRM also proposed: (1) Clarification of certain existing regulatory definitions of parties involved in the gasoline distribution network; and (2) marketing requirements for gasoline-alcohol blends if such blends are granted a 1.0 psi RVP allowance. As described more fully below, these regulatory provisions are being promulgated as proposed. The summary and analysis of comments document that has been placed in the rulemaking docket as an appendix to the FRIA includes responses to any comments received on these proposals.

1. Definitions

Definitions of most parties involved in the gasoline distribution network have already been adopted by the Agency at 40 CFR 80.2, and these will be applicable to liability determinations for the volatility regulations. The volatility NPRM proposed two clarifications of these regulatory definitions. First, the NPRM proposed to expand the definition of "distributor" in 40 CFR 80.2(l) to include a person who transports gasoline between an import facility (any facility owned, leased, or controlled by an importer) and a retail outlet or wholesale purchaser-consumer facility. Second, the NPRM proposed to add a new definition of "carrier" at 40 CFR 80.2(t), to be defined as any distributor who transports petroleum products without taking title to the product or altering either the quality or quantity of the product. The Agency believes that both of these changes (in conjunction with the liability provisions promulgated today) will result in a more equitable allocation of responsibility for regulatory compliance, and is promulgating these provisions as proposed.

In response to public comments, the Agency is also promulgating new definitions of "ethanol blending plant" and "ethanol blender" at 40 CFR 80.2 (u) and (v), respectively. These new definitions are discussed more fully in section V.B.3 of this notice, above.

2. Gasoline-Alcohol Blend Marketing Requirements

The volatility NPRM proposed certain requirements that would apply to the content and marketing of gasoline-alcohol blends should the Agency grant a temporary or permanent 1 psi RVP allowance for such blends. As discussed elsewhere in this notice, today's final rules provide such an allowance on an interim basis for gasoline-ethanol blends commonly known as gasohol. Such blends must contain at least 9% ethanol (by volume) and their maximum ethanol content may not exceed any applicable waiver conditions under section 211(f)(4) of the Clean Air Act.

In today's notice, the Agency is also taking final action to promulgate the marketing requirements as proposed for ethanol blends. In order to qualify for the additional 1 psi allowance, pumps from which such fuel is dispensed at retail outlets and wholesale purchaser-consumer facilities must indicate that the fuel being dispensed contains ethanol (and must specify its percentage concentration). Invoice and other delivery documents must be similarly labeled, retained for at least one year, and available for inspection during that period by the Agency. The Agency believes that these requirements will aid enforcement and will not be unduly burdensome on regulated parties.

Because the "first step" RVP regulations do not include an allowance for methanol blends, the marketing requirements promulgated today do not apply to such blends. However, should the "second step" RVP regulations that the Agency intends to promulgate in the near future contain an allowance for methanol blends, the Agency intends that these marketing requirements would be extended to such blends as well.

VI. Analysis of Economic and Environmental Impacts

EPA's analysis of the economic and environmental impacts of today's action draws from both the Draft RIA and more recent evaluations performed by EPA and collected in the Final RIA. The recent analyses reflect EPA's response to comments on the proposal as well as new data and improved methods which EPA has developed or obtained.

A. Economic Impacts

This first phase of EPA's 2-phase volatility control program will require changes in gasoline refining that will increase the cost of gasoline production. However, because these Phase I volatility standards will not require new capital investment, the cost to refiners will stem from the need to substitute more expensive processes and/or gasoline components for relatively cheap butane. This Phase I program involves no requirements for vehicle-based emission control improvements, and thus no costs will be incurred by vehicle manufacturers. The following paragraphs summarize our revised analyses of refinery costs.

The refinery cost modeling work performed for EPA by Bonner and Moore Management Science for this final analysis is improved in several ways over the modeling done for the NPRM. (The latest modeling results were placed in the docket shortly after the NPRM was published and referenced in the Notice of Public Hearing (52 FR 33438).) First, it was possible to incorporate directly into the model the estimated effect on refineries of reducing the demand for gasoline under a range of volatility-control scenarios. (RVP control reduces the amount of purchased gasoline which is lost to evaporation, thus reducing the volume of gasoline sold.) Second, the latest modeling was able to estimate the impact of a drop in the price of butane on refiners' raw material purchases and on the demand for the natural gas liquids (NGL) industry's products. A final improvement was to extend the range of the original modeling (which evaluated RVP reductions of only one and two psi) to evaluate reductions of one, two, and three psi. (This latter change has improved the accuracy of EPA's estimates of refinery costs at lower levels of RVP control, although this is not an issue for the moderate reductions adopted today.)

In addition to having Bonner and Moore improve the modeling itself, in response to comments EPA modified its use of the modeling results in three important ways to better reflect reality. First, we excluded the results from Bonner and Moore's Region 4 (California) because the model's predicted base case fuel contained unrealistically high levels of butane and low levels of pentane. Second, the projection of future RVPs absent controls was revised to reflect 1987

levels. Third, nationwide projections of fuel consumption were updated.

EPA also applied the results of the modeling in a more sophisticated manner. Using the revised state-by-state RVP standards discussed above, EPA determined the current and final RVP level of each state's fuel by month for each control scenario and applied a refinery cost to each case. This allowed the determination of a separate cost for each of the three control levels (9.0, 9.5, and 10.5 RVP).

EPA projects the refinery cost of the Phase I program to be $247 million dollars per year, which can be expressed as 0.54 cents per gallon of controlled gasoline during the summer control periods. Offsetting this cost will be savings for consumers of about $104 million per year, or 0.23 cents per gallon resulting from increased fuel economy as gasoline's energy density increases and as less fuel is lost through evaporation. (As will be described in the next section, the emission recovery credit is based on the DRIA estimates. The inclusion of running losses would increase this savings dramatically.) On a discounted basis, the increased fuel cost to consumers will be about $14.50 per vehicle lifetime and will be offset by savings of about $6.10, resulting in a net cost of about $8.40 per vehicle over its life. It should be pointed out that the refinery cost estimated here assumes no capital investment. Over the longer term, these RVP reductions would be much cheaper.

The moderate RVP reductions of this Phase I program will somewhat reduce the market for butane as a gasoline component. As discussed under Public Participation and Impact on Small Entities below, EPA believes that while there will be a reduction in revenues for NGL facilities, this effect will not be severe. Since the lost revenues will be translated primarily into increased revenues or economic savings for other parties, this is not considered a societal cost but rather a transfer payment from one sector of the economy to another. The refinery costs estimated by Bonner and Moore were calculated using a constant butane price, so no credit was taken for refineries being able to purchase butane at lower prices.

Some additional imported crude oil may need to be purchased and processed in order to replace part of the butane displaced by this Phase I program. However, because much of the butane will not need to be replaced since it was lost through evaporation anyway, EPA does not expect the effect on imported crude to be substantial. For example, the fraction of butane in gasoline that is lost to evaporation before reaching the engine (as described below under "Public Participation," this may be substantial on some hot days) need not be replaced. In other words, because less evaporation will occur, gasoline demand will be reduced. The only butane which needs to be replaced is the butane actually used by the engine. In addition, Bonner and Moore estimates that much (if not all) of the butane displaced from direct use in gasoline will be used in the production of other gasoline components, especially after time allows investment in equipment to utilize additional butane. (Bonner and Moore did not account for the likely increase in the production of methyl- and/or ethyl tertiary-butyl ether (MTBE and/or ETBE) which would also allow butane to indirectly be used in gasoline.) Overall, we estimate any increase in imported crude oil due to this Phase I program to be at most 81,000 barrels/day, and much less if the control of running losses were considered.

B. Environmental Impacts

EPA's environmental impact analysis for this Phase I volatility control program is based primarily on the analysis presented in the DRIA. Two modifications were made to maintain consistency with the refinery cost analysis: (1) estimates of vehicle miles traveled were increased to be consistent with fuel consumption projections, and (2) projections of future RVPs absent controls were reduced. Since the time of the proposal, the Agency has continued to refine both our methods of estimating evaporative VOC emissions and our understanding of the sources of these emissions. These improvements have the effect of significantly increasing our estimates of current and future evaporative emissions (see Chapter 4 of FRIA). While these latest estimates are considered preliminary, EPA is very confident that any further revisions will result in emission inventories and reductions due to RVP control that are much greater than the DRIA estimates. Thus, EPA believes the use of the DRIA results for this Phase I action probably understates the actual emission reductions available from the program.

EPA intends to continue to improve its estimates of the effect of RVP and vehicle controls as it continues development of the second phase of volatility control. For the purposes of this Phase I regulation, however, the figures presented here more than justify the need and cost effectiveness of this program. The net effect of improvements to the DRIA analysis would tend to improve the effectiveness of the program (*i.e.*, credit the program with achieving greater VOC control than the DRIA would indicate). Thus, if this program is cost effective using the DRIA results, it would be even more so using revised emission reduction figures, as we demonstrate below.

Based on the DRIA analysis, we project that this Phase I RVP control program will reduce VOC emissions nationally by 0.674 million tons per year (on an annual basis), or 3 percent of total VOC emissions from all sources. In the 61 non-California, non-attainment areas EPA projects a reduction of 0.310 million tons per year, or 5 percent of total VOC emissions in these areas. For comparison purposes, the preliminary data for running losses suggest that the volatility standards promulgated here would result in 2.0 million tons of VOC control nationwide and 0.86 million tons of VOC in non-California non-attainment areas (see Chapter 3 of the FRIA).

C. Cost Effectiveness

EPA has re-calculated the incremental cost effectiveness for the Phase I RVP control program based on the projections of costs and emission reductions summarized above. The methodology we have used in this updated analysis is essentially the same as the incremental cost effectiveness methodology used in the volatility NPRM (comments in this area are addressed in the Final RIA). We focus today on cost effectiveness values comparable in concept to the "adjusted" values in the NPRM. Specifically, the calculations are performed in such a way as to make possible valid comparisons of seasonal RVP control with year-round, non-attainment area only ozone control programs. As described in the Final RIA, emission reductions were first expanded to those which would occur if the program were year-round and then adjusted downwards to include only non-attainment area reductions. Finally, a $250 per ton credit was added to acknowledge a conservative value for attainment area emission reductions.

Table I presents the cost effectiveness of the Phase I program in the year 1990 for the overall nationwide program. For comparison, the table also shows separately the cost effectiveness on a class by class basis. (The volatility class designations A, B, and C correspond to areas which will receive 9.0, 9.5, and 10.5 RVP fuel, respectively, during the summertime control period. The actual geographic areas differ slightly from ASTM's volatility class areas, as discussed above.) Only Class B and C figures are shown, since all surveyed Class A areas are currently at or below

9.0 RVP on average and little, if any, cost or benefit should occur.

TABLE 1: INCREMENTAL COST EFFECTIVENESS OF PHASE I RVP CONTROL IN 1990

[Dollars per ton]

Nationwide	236
Class B	576
Class C	165

Although the cost per ton of VOC control in Class B areas is somewhat higher than that in Class C areas, the values are still well below those for essentially all potential VOC control programs. EPA believes this Phase I program represents a very attractive step towards addressing the ozone non-attainment problem in the near term.

VII. Public Participation

The vast majority of public comments on the volatility NPRM were primarily directed at the second, more stringent phase of RVP control proposed at that time. With the exception of comments relating to enforcement, relatively few comments were focused specifically on the proposed Phase I program promulgated today. It is the latter set of comments—those which relate to the Phase I program—which are summarized and addressed below and/or in the Final RIA. EPA will address comments pertaining to Phase II of RVP control at the time we promulgate those regulations.

The comments relevant to this Phase I program generally fall into the following categories: (1) Disagreement with EPA's analysis of refinery costs and other costs and credits, (2) disagreement with EPA's analysis of current and/or future VOC emissions and air quality, with or without RVP control, (3) disagreement with aspects of EPA's cost effectiveness evaluation methodology, (4) concerns with EPA's proposed enforcement plan, (5) comments on the impacts of providing or not providing an RVP allowance for gasohol, (6) the impact of RVP control on the natural gas liquids industry, and (7) suggestions for alternative control programs.

A. Economic Impact

Although commenters from the refining industry preferred RVP standards that would simply cap volatility at the current ASTM levels, API specifically recommended alternative RVP reductions to 10.5, 9.5, and 9.0 RVP. No refiner expressed serious concern about the feasibility of producing complying fuel at about these levels, nor demonstrated the need for capital investment (see Chapter 4 of the FRIA for details).

API modified Bonner and Moore's refinery modeling results to estimate a refinery cost for RVP reductions to 10.5, 9.5 and 9.0. Their estimated total annual costs exceed the revised EPA refinery cost presented above by roughly a factor of two. However, when the other revisions to the NPRM contained in this Phase I rule are taken into account and insufficiently supported adjustments are removed, there is essentially no difference between API's and EPA's estimates. However, EPA remains open to further comment concerning our analysis of the cost of the second phase of RVP control pending receipt of comments referred to in section II above. Moreover, for the purpose of this Phase I action, even if EPA accepted API's original cost figures, it would not change our decision to implement these RVP controls.

B. Environmental and Cost-Effectiveness Analysis

Comments on EPA's analysis of the environmental impact and the cost effectiveness of the volatility NPRM, as well as EPA's responses to those comments, are discussed in the final RIA.

C. Enforcement System

The comments and EPA's responses relating to the proposed system of enforcing RVP controls are outlined above under "Summary of the Enforcement Mechanism and Analysis of Comments Thereon" and in an appendix to the final RIA.

D. RVP Control and Alcohol Blends

As indicated above, EPA has decided to implement Phase I of its proposed volatility control program for gasoline and alcohol blends. Methanol blends will have to meet the same RVP standard as gasoline; ethanol blends (*i.e.*, gasohol) will have to meet standards 1.0 psi higher.

In the NPRM, EPA requested comment on three approaches to regulating gasohol and methanol blend RVP. EPA is postponing its ultimate decision on how to treat ethanol and methanol blend RVP. Those decisions will address all comments concerning air quality, economics, and other related issues. In the interim, EPA has decided to maintain the status quo with respect to both types of blends.

Methanol blends (in unleaded gasolines, since only these fuels are addressed in section 211(f) of the Clean Air Act as amended) currently have to meet the ASTM RVP specifications for gasoline. This requires that a special gasoline base stock be used and this will not change under this Phase I rule.

Gasohol RVP is currently unregulated. Practically speaking, however, 10 percent ethanol is added to typical gasoline and the result is a blend somewhat less than 1.0 RVP higher than the base gasoline. As outlined in the NPRM, and supported in the comments received, even by the ethanol industry, to continue the non-regulation of gasohol RVP once gasoline RVP was reduced would create an incentive to use high RVP gasoline for blending with ethanol, effectively creating a loophole in the standard. Thus, to maintain the status quo for gasohol (*i.e.*, splash blending in typical gasoline), some control must be placed on gasohol RVP. Based on the NPRM and an analysis of the comments (see the Final RIA), the option of granting a 1.0 RVP allowance for gasohol under the Phase I rule will continue to allow splash blending, but prevent the use of gasolines not meeting the gasoline RVP standards from being used a base stock. EPA will, as noted above, address how to treat alcohol blend RVP in a final fashion with our analysis of the second phase of RVP control.

E. Impact on Natural Gas Liquids Industry

The potential economic impact of a volatility control program on the NGL industry was the subject of extensive comment from companies that condense liquid butanes and other NGLs from raw natural gas; their trade organization, the Gas Processers Association (GPA); and individuals holding natural gas interests.

The vast majority of comments were based on an assumption that RVP controls would eliminate the use of butanes (particularly normal butane) in the production of gasoline during the summer. Given this premise, they foresaw devastating impacts on the natural gas processing and producing industries. Such comments are primarily aimed at the more stringent long-term RVP control program proposed for 1992 and later. However, the Phase I program under discussion here will still have some effect on the butane market.

After reassessing this issue, EPA cannot agree with the basic premise of most comments; *i.e.*, that the high-value use for butane in summertime gasoline will be completely lost, glutting the market with cheap butane that would displace lower-value fuels and petrochemical feedstocks. While we agree that butane will drop somewhat in price, Bonner and Moore's modeling of

the refinery and petrochemical industries illustrates that the industry dynamics which are likely to follow RVP control are very different from those suggested in the comments.

Bonner and Moore's results indicate that after a relatively moderate drop in price (about 11 percent or less), refiners would themselves absorb the surplus of butane created by RVP controls. Rather than using the butane directly as a gasoline additive, most refiners will shift their production patterns to reduce butane production within the refinery and emphasize processes which use butane as a feedstock for high-octane, low-volatility gasoline components (such as alkylate). In doing so, it appears that the current market for butane in gasoline production will largely remain intact. Bonner and Moore reached this conclusion despite the fact that their model did not consider the expansion of MTBE production. With existing or new isomerization and dehydrogenation capacity, normal butane can be a feedstock for MTBE and potentially for ETBE. We expect the current growth in such capacity to continue and probably increase under a volatility control scenario as more butane becomes available during the summertime months. This added demand for butane should further reduce the price impact on butane.

Given the 11 percent (or less) price reduction for butane estimated above, we also cannot agree that the deep and broad consequences predicted in the comments will occur (including widespread closings of gas processing and related facilities and the shutting in of natural gas thus not processed for commerce). While we do not believe the size of the butane market will change significantly, we do believe there will be a loss of up to 11 percent of butane revenues to gas processors for 5 months of the year. This effect should not be severe both because the decrease in butane prices should be relatively small (as noted above) and because for most companies operating gas processing facilities, butane accounts for only a fraction of their business (*e.g.*, less than 1 percent to 40 percent of revenues). For a likely maximum loss in revenues of around 11 percent, loss of revenues overall should be no more than 5 percent, and typically much less. In the short term, the largest impact is expected to be on imports of butane, which have been growing in recent years.

If a domestic gas processing facility is so economically marginal as to be threatened by even this small drop in butane prices, we believe there would be renegotiation of the nature of the contract between the processor of the natural gas and the producers serviced by the processing facility. Since gas producers need to have the condensate removed in order to market their gas, we expect that most producers would prefer to receive a reduced percentage of the gas processing income than to stop production. Only in a case where the producer was unusually dependent on revenues from the processor does it appear that a producer may not renegotiate to keep the processor economically viable. From the perspective of a gas producer, it appears that the normal fluctuations in natural gas prices should be much more problematic than the loss of revenues due to this action. The effect is certainly much less severe than the loss of revenues that occurred in 1986, when crude oil prices plummetted and all condensate component prices dropped as much as 50 percent with a strong impact on plant economics but without massive closings.

Another issue on which we disagree with the NGL industry relates to whether butane's high price as a gasoline component is a true reflection of high intrinsic economic value, the reduction of which represents a net economic loss to society. Important in this regard is the fact that on hot summer days the difference between 9 and 11.5 RVP contributes to evaporative emissions and running losses representing roughly 1–2 percent of all gasoline consumed. However, this difference in RVP is caused by an additional 5 percent of butane being added to the gasoline. In other words, under some conditions roughly 20–40 percent of the butane added to gasoline to raise its RVP never reaches the engine and is wasted. Even under average conditions, the value of butane to vehicle owners may be less at current RVP levels than that of gasoline, even considering its octane enhancement value. Consumers have little opportunity to know the RVP of the gasoline they buy nor a perception of how much is lost to evaporation. Insofar as any significant volatility-related emissions occur, the market cannot place a proper value on this wasted butane and consumers continue to pay a high price for the butane in the gasoline they buy. In this respect, shifting butane away from its apparent "high-value" use in gasoline may not even be a shift in value, since its true value in gasoline is likely not much different than its alternative, apparent "low-value" uses.

F. Other Alternatives

EPA has considered all alternative evaporative emission control programs presented in the comments that were supported by data and technical analysis. In addition, we received a wide range of suggestions that did not specifically challenge our analysis, that did not offer specific analysis to support the suggestion, or that were aimed at regulatory goals different from EPA's; these we have not attempted to address directly. Because the RVP controls promulgated here are extremely cost effective and further controls without providing more time for equipment investment appear limited by refining technology, we are confident that we have thoroughly considered all realistic options to this Phase I program.

VIII. Interaction With State Volatility Requirements

As discussed in the preamble for the volatility NPRM, section 211(c)(4) of the Clean Air Act prohibits states from enacting controls on a fuel that are different from EPA controls, except in certain circumstances. Thus, the Phase I RVP control program finalized today will preempt any state (except California) from enforcing RVP controls different from EPA's unless such a program is approved in a State Implementation Plan (SIP) (or unless the purpose is something other than air quality improvement).

EPA's decision on whether to approve an ozone SIP amendment proposing a different RVP control program will hinge on whether the Agency makes a finding that such a program is necessary to achieve the National Ambient Air Quality Standard for ozone. EPA has proposed to approve such a SIP revision for Massachusetts, but no final decision has been made. EPA is already working with other states interested in adopting RVP controls more restrictive than those EPA is promulgating today.

IX. Paperwork Reduction Act

The information collection requirements contained in this rule have been approved by the Office of Management and Budget (OMB) under the provisions of the *Paperwork Reduction Act*, 44 U.S.C. 3501 *et seq.*, and have been assigned OMB control number 2060–0178.

Public recordkeeping burden is estimated to be approximately 1 hour a year per facility. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Chief, Information Policy Branch, PM–223, U.S.

Environmental Protection Agency, 401 M St. SW., Washington, DC 20460, and to the Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, DC 20503, marked "Attention: Desk Officer for EPA."

X. Impact on Small Entities

EPA's evaluation of the effects of the proposed RVP control program on small refiners, performed for the NPRM and summarized in that preamble, remains valid. Our conclusion then and now is that RVP control programs, including this Phase I program, will improve the competitive position of some small refiners (those with catalytic cracking capability), while likely causing a small reduction in revenues (relative to total revenues) for other small refiners.

In the NGL industry, many gas processors are small entities. However, as discussed above under Public Participation, we do not expect the loss in revenues to gas processors to be severe under RVP control, particularly for this moderate Phase I program.

Finally, EPA believes that the impacts on other small entities (*e.g.*, small blenders, importers, retailers, etc.) would occur primarily in the form of a slightly higher wholesale gasoline price which would then be passed along in product price increases. Since all wholesale suppliers would increase prices by about the same amount, the competitive environment for small entities purchasing that gasoline should not be affected significantly.

As a result of this analysis, performed under section 605 of the Regulatory Flexibility Act, I certify that the regulations promulgated in this notice will not have a significant impact on a substantial number of small entities.

XI. Administrative Designation and Regulatory Analysis

The Administrator has determined that this action constitutes a major regulation. Accordingly, final analyses on issues pertinent to this action have been completed. The Draft Regulatory Impact Analysis prepared under Executive Order 12291 contains much of the final analysis of air quality impact, as described above; the addressing of comments and the final analysis for the remaining issues are found in this preamble and the Final Regulatory Impact Analysis.

This regulation was submitted to the Office of Management and Budget (OMB) for review as required by Executive Order 12291. Any written comments from OMB and any EPA response to those comments are in the public docket for this rulemaking.

Single copies of the Final RIA may be obtained by contacting: Ms. Carol Bragg, U.S. EPA, 2565 Plymouth Road, Ann Arbor, MI 48105, Telephone: (313) 668–4295.

XII. Statutory Authority

Authority for the actions promulgated in this notice is granted to EPA by sections 114, 211, and 301 of the Clean Air Act (42 U.S.C. 7414, 7545, and 7601).

List of Subjects in 40 CFR Part 80

Fuel additives, Gasoline, Motor vehicle pollution, Penalties, Reporting and recordkeeping requirements.

Dated: March 10, 1989.

William K. Reilly,

Administrator.

For the reasons set out in the preamble, Part 80 of Title 40 of the Code of Federal Regulations is amended as follows:

PART 80—REGULATION OF FUELS AND FUEL ADDITIVES

1. The authority citation for Part 80 is revised to read as follows:

Authority: Secs. 114, 211 and 301(a) of the Clean Air Act as amended, 42 U.S.C. 7414, 7545, and 7601(a).

2. Section 80.2 is amended by revising paragraph (l) and by adding new paragraphs (t), (u), and (v), to read as follows:

§ 80.2 Definitions.

* * * * *

(l) "Distributor" means any person who transports or stores or causes the transportation or storage of gasoline at any point between any gasoline refinery or importer's facility and any retail outlet or wholesale purchaser-consumer's facility.

* * * * *

(t) "Carrier" means any distributor who transports or stores or causes the transportation or storage of gasoline without taking title to or otherwise having any ownership of the gasoline, and without altering either the quality or quantity of the gasoline.

(u) "Ethanol blending plant" means any refinery at which gasoline is produced solely through the addition of ethanol to gasoline, and at which the quality or quantity of gasoline is not altered in any other manner.

(v) "Ethanol blender" means any person who owns, leases, operates, controls, or supervises an ethanol blending plant.

3. New § 80.27 is added, to read as follows:

§ 80.27 Controls and prohibitions on gasoline volatility.

(a) *Prohibited activities.* During regulatory control periods no refiner, importer, distributor, reseller, carrier, retailer or wholesale purchaser-consumer shall sell, offer for sale, dispense, supply, offer for supply, or transport gasoline whose Reid vapor pressure exceeds the applicable standard. As used in this section and § 80.28, "applicable standard" means the standard listed in this paragraph for the geographical area and time period in which gasoline is intended to be dispensed to motor vehicles or, if such area and time period cannot be determined, the standard listed in this paragraph that specifies the lowest Reid vapor pressure for the year in which the gasoline is sampled. As used in this section and § 80.28, "regulatory control periods" mean the following periods during calendar year 1989: June 30, to September 15 for retail outlets and wholesale purchaser-consumer facilities; and June 1, to September 15 for all other facilities. As used in this section and § 80.28, "regulatory control periods" mean the following periods during calendar year 1990 and each calendar year thereafter: June 1 to September 15 for retail outlets and wholesale purchaser-consumer facilities; and May 1 to September 15 for all other facilities.

APPLICABLE STANDARDS [1]

State	May	June	July	Aug.	Sept.
Alabama	10.5	10.5	9.5	9.5	10.5
Arizona	9.5	9.0	9.0	9.0	9.5
Arkansas	10.5	10.5	9.5	9.5	10.5
California: [2]					
North Coast	10.5	9.5	9.5	9.5	9.5
South Coast	9.5	9.5	9.5	9.5	9.5
Southeast	9.5	9.5	9.5	9.5	9.5

APPLICABLE STANDARDS [1]—Continued

State	May	June	July	Aug.	Sept.
Interior	9.5	9.5	9.5	9.5	9.5
Colorado	10.5	9.5	9.5	9.5	9.5
Connecticut	10.5	10.5	10.5	10.5	10.5
Delaware	10.5	10.5	10.5	10.5	10.5
District of Columbia	10.5	10.5	10.5	10.5	10.5
Florida	10.5	10.5	10.5	10.5	10.5
Georgia	10.5	10.5	9.5	9.5	10.5
Idaho	10.5	10.5	10.5	10.5	10.5
Illinois:					
North of 40° Latitude	10.5	10.5	10.5	10.5	10.5
South of 40° Latitude	10.5	10.5	9.5	9.5	10.5
Indiana	10.5	10.5	10.5	10.5	10.5
Iowa	10.5	10.5	10.5	10.5	10.5
Kansas	10.5	10.5	9.5	9.5	10.5
Kentucky	10.5	10.5	10.5	10.5	10.5
Louisiana	10.5	10.5	9.5	9.5	10.5
Maine	10.5	10.5	10.5	10.5	10.5
Maryland	10.5	10.5	10.5	10.5	10.5
Massachusetts	10.5	10.5	10.5	10.5	10.5
Michigan	10.5	10.5	10.5	10.5	10.5
Minnesota	10.5	10.5	10.5	10.5	10.5
Mississippi	10.5	10.5	9.5	9.5	10.5
Missouri	10.5	10.5	9.5	9.5	10.5
Montana	10.5	10.5	10.5	10.5	10.5
Nebraska	10.5	10.5	10.5	10.5	10.5
Nevada:					
North of 38° Latitude	10.5	9.5	9.5	9.5	9.5
South of 38° Latitude	9.5	9.5	9.5	9.5	9.5
New Hampshire	10.5	10.5	10.5	10.5	10.5
New Jersey	10.5	10.5	10.5	10.5	10.5
New Mexico:					
North of 34° Latitude	9.5	9.0	9.0	9.0	9.5
South of 34° Latitude	9.5	9.0	9.0	9.0	9.5
New York	10.5	10.5	10.5	10.5	10.5
North Carolina	10.5	10.5	9.5	9.5	10.5
North Dakota	10.5	10.5	10.5	10.5	10.5
Ohio	10.5	10.5	10.5	10.5	10.5
Oklahoma	10.5	9.5	9.5	9.5	9.5
Oregon:					
East of 122° Longitude	10.5	10.5	10.5	10.5	10.5
West of 122° Longitude	10.5	10.5	10.5	10.5	10.5
Pennsylvania	10.5	10.5	10.5	10.5	10.5
Rhode Island	10.5	10.5	10.5	10.5	10.5
South Carolina	10.5	10.5	9.5	9.5	10.5
South Dakota	10.5	10.5	10.5	10.5	10.5
Tennessee	10.5	10.5	9.5	9.5	10.5
Texas:					
East of 99° Longitude	10.5	9.5	9.5	9.5	9.5
West of 99° Longitude	9.5	9.0	9.0	9.0	9.5
Utah	10.5	9.5	9.5	9.5	9.5
Vermont	10.5	10.5	10.5	10.5	10.5
Virginia	10.5	10.5	10.5	10.5	10.5
Washington:					
East of 122° Longitude	10.5	10.5	10.5	10.5	10.5
West of 122° Longitude	10.5	10.5	10.5	10.5	10.5
West Virginia	10.5	10.5	10.5	10.5	10.5
Wisconsin	10.5	10.5	10.5	10.5	10.5
Wyoming	10.5	10.5	10.5	10.5	10.5

[1] Standards are expressed in pounds per square inch (psi).

[2] California areas include the following counties:

North Coast—Alameda, Contra Costa, Del Norte, Humbolt, Lake, Marin, Mendocino, Monterey, Napa, San Benito, San Francisco, San Mateo, Santa Clara, Santa Cruz, Solano, Sonoma, and Trinity.

Interior—Lassen, Modoc, Plumas, Sierra, Siskiyou, Alpine, Amador, Butte, Calaveras, Colusa, El Dorado, Fresno, Glenn, Kern (except that portion lying east of the Los Angeles County Aqueduct), Kings, Madera, Mariposa, Merced, Placer, Sacramento, San Joaquin, Shasta, Stanislaus, Sutter, Tehama, Tulare, Tuolumne, Yolo, Yuba, and Nevada.

South Coast—Orange, San Diego, San Luis Obispo, Santa Barbara, Ventura, and Los Angeles (except that portion north of the San Gabriel mountain range and east of the Los Angeles County Aqueduct).

Southeast—Imperial, Riverside, San Bernardino, Los Angeles (that portion north of the San Gabriel mountain range and east of the Los Angeles County Aqueduct), Mono, Inyo, and Kern (that portion lying east of the Los Angeles County Aqueduct).

(b) *Determination of compliance.* Compliance with the standards listed in paragraph (a) of this section shall be determined by use of one of the sampling methodologies specified in Appendix D to this part and one of the testing methodologies specified in Appendix E to this part.

(c) *Liability.* Liability for violations of paragraph (a) of this section shall be determined according to the provisions of § 80.28.

(d) *Special provisions for alcohol blends.* (1) Any gasoline which meets the requirements of paragraph (d)(2) of this section and which is marketed in accordance with the requirements of paragraph (d)(3) of this section shall not be in violation of this section if its Reid

vapor pressure does not exceed the applicable standard in paragraph (a) of this section by more than one pound per square inch.

(2) In order to qualify for the special regulatory treatment specified in paragraph (d)(1) of this section, gasoline must contain at least 9% ethanol (by volume). The ethanol content of gasoline shall be determined by use of one of the testing methodologies specified in Appendix F to this part. The maximum ethanol content of gasoline shall not exceed any applicable waiver conditions under section 211(f)(4) of the Clean Air Act.

(3) In order to qualify for the special regulatory treatment specified in paragraph (d)(1) of this section, gasoline must be marketed in accordance with each of the following requirements:

(i) Each gasoline pump stand from which such gasoline is dispensed at a retail outlet or wholesale purchaser-consumer facility shall be affixed with a legible and conspicuous label which states that the gasoline dispensed from the pump contains ethanol and the percentage concentration of ethanol.

(ii) Each invoice, loading ticket, bill of lading, delivery ticket and other document which accompanies the shipment of such gasoline shall contain a legible and conspicuous statement that the gasoline being shipped contains ethanol. Such documents shall be retained by distributors, resellers, carriers, retailers, and wholesale purchaser-consumers for at least one year, and shall be available for inspection by the Administrator or his authorized representative during such period.

(Approved by the Office of Management and Budget under control number 2060-0178)

4. New § 80.28 is added, to read as follows:

§ 80.28 Liability for violations of gasoline volatility controls and prohibitions.

(a) *Violations at refineries or importer facilities.* Where a violation of the applicable standard set forth in § 80.27 is detected at a refinery that is not an ethanol blending plant or at an importer's facility, the refiner or importer shall be deemed in violation.

(b) *Violations at carrier facilities.* Where a violation of the applicable standard set forth in § 80.27 is detected at a carrier's facility, whether in a transport vehicle, in a storage facility, or elsewhere at the facility, the following parties shall be deemed in violation:

(1) The carrier, except as provided in paragraph (g)(1) of this section; and

(2) The refiner (if he is not an ethanol blender) at whose refinery the gasoline was produced or the importer at whose import facility the gasoline was imported, except as provided in paragraph (g)(2) of this section; and

(3) The ethanol blender (if any) at whose ethanol blending plant the gasoline was produced, except as provided in paragraph (g)(6) of this section.

(c) *Violations at branded distributor facilities, reseller facilities, or ethanol blending plants.* Where a violation of the applicable standard set forth in § 80.27 is detected at a distributor facility, a reseller facility, or an ethanol blending plant which is operating under the corporate, trade, or brand name of a gasoline refiner or any of its marketing subsidiaries, the following parties shall be deemed in violation:

(1) The distributor or reseller, except as provided in paragraph (g)(3) of this section;

(2) The carrier (if any), if the carrier caused the gasoline to violate the applicable standard;

(3) The refiner under whose corporate, trade, or brand name (or that of any of its marketing subsidiaries) the distributor, reseller, or ethanol blender is operating, except as provided in paragraph (g)(4) of this section; and

(4) The ethanol blender (if any) at whose ethanol blending plant the gasoline was produced, except as provided in paragraph (g)(6) of this section.

(d) *Violations at unbranded distributor facilities or ethanol blending plants.* Where a violation of the applicable standard set forth in § 80.27 is detected at a distributor facility or an ethanol blending plant not operating under a refiner's corporate, trade, or brand name, or that of any of its marketing subsidiaries, the following parties shall be deemed in violation:

(1) The distributor, except as provided in paragraph (g)(3) of this section;

(2) The carrier (if any), if the carrier caused the gasoline to violate the applicable standard;

(3) The refiner (if he is not an ethanol blender) at whose refinery the gasoline was produced or the importer at whose import facility the gasoline was imported, except as provided in paragraph (g)(2) of this section; and

(4) The ethanol blender (if any) at whose ethanol blending plant the gasoline was produced, except as provided in paragraph (g)(6) of this section.

(e) *Violations at branded retail outlets or wholesale purchaser-consumer facilities.* Where a violation of the applicable standard set forth in § 80.27 is detected at a retail outlet or at a wholesale purchaser-consumer facility displaying the corporate, trade, or brand name of a gasoline refiner or any of its marketing subsidiaries, the following parties shall be deemed in violation:

(1) The retailer or wholesale purchaser-consumer, except as provided in paragraph (g)(5) of this section;

(2) The distributor and/or reseller (if any), except as provided in paragraph (g)(3) of this section;

(3) The carrier (if any), if the carrier caused the gasoline to violate the applicable standard;

(4) The refiner whose corporate, trade, or brand name (or that of any of its marketing subsidiaries) is displayed at the retail outlet or wholesale purchaser-consumer facility, except as provided in paragraph (g)(4) of this section; and

(5) The ethanol blender (if any) at whose ethanol blending plant the gasoline was produced, except as provided in paragraph (g)(6) of this section.

(f) *Violations at unbranded retail outlets or wholesale purchaser-consumer facilities.* Where a violation of the applicable standard set forth in § 80.27 is detected at a retail outlet or at a wholesale purchaser-consumer facility not displaying the corporate, trade, or brand name of a refinery or any of its marketing subsidiaries, the following parties shall be deemed in violation:

(1) The retailer or wholesale purchaser-consumer, except as provided in paragraph (g)(5) of this section;

(2) The distributor (if any), except as provided in paragraph (g)(3) of this section;

(3) The carrier (if any), if the carrier caused the gasoline to violate the applicable standard; and

(4) The ethanol blender (if any) at whose ethanol blending plant the gasoline was produced, except as provided in paragraph (g)(6) of this section.

(g) *Defenses.* (1) In any case in which a carrier would be in violation under paragraph (b)(1) of this section, the carrier shall not be deemed in violation if he can demonstrate:

(i) Bills of lading, invoices, delivery tickets, loading tickets or other documents from the refiner at whose refinery the gasoline was produced, the importer at whose facility the gasoline was imported, or the carrier, reseller, or distributor from whom the gasoline was received, which represented to the carrier that the gasoline was in compliance with the applicable standard when delivered to the carrier; and

(ii) Evidence of an oversight program conducted by the carrier, such as periodic sampling and testing of incoming gasoline, for monitoring the

volatility of gasoline stored or transported by that carrier; and

(iii) That the violation was not caused by the carrier or his employee or agent.

(2) In any case in which a refiner or importer would be in violation under paragraph (b)(2) or (d)(3) of this section, the refiner or importer shall not be deemed in violation if he can demonstrate:

(i) That the violation was not caused by him or his employee or agent; and

(ii) Test results, performed in accordance with the sampling and testing methodologies set forth in Appendices D and E to this part, which evidence that the gasoline determined to be in violation was in compliance with the applicable standard when it was delivered to the next party in the distribution system.

(3) In any case in which a distributor or reseller would be in violation under paragraphs (c)(1), (d)(1), (e)(2), or (f)(2) of this section, the distributor or reseller shall not be deemed in violation if he can demonstrate:

(i) That the violation was not caused by him or his employee or agent; and

(ii) Bills of lading, invoices, delivery tickets, loading tickets or other documents from the refiner at whose refinery the gasoline was produced, the importer at whose facility the gasoline was imported, or the carrier, reseller or distributor from whom the gasoline was received, which represented to the distributor or reseller that the gasoline was in compliance with the applicable standard when delivered to the distributor or reseller; and

(iii) Evidence of an oversight program conducted by the distributor or reseller, such as periodic sampling and testing of gasoline, for monitoring the volatility of gasoline that the distributor or reseller sells, supplies, offers for sale or supply, or transports.

(4) In any case in which a refiner would be in violation under paragraphs (c)(3) or (e)(4) of this section, the refiner shall not be deemed in violation if he can demonstrate all of the following:

(i) Test results, performed in accordance with the sampling and testing methodologies set forth in Appendices D and E to this part at the refinery at which the gasoline was produced, which evidence that the gasoline determined to be in violation was in compliance with the applicable standard when transported from the refinery; and

(ii) That the violation was not caused by him or his employee or agent; and

(iii) That the violation:

(A) Was caused by an act in violation of law (other than the Act or this part), or an act of sabotage or vandalism, whether or not such acts are violations of law in the jurisdiction where the violation of the requirements of this part occurred, or

(B) Was caused by the action of a reseller, an ethanol blender, or a retailer supplied by such reseller or ethanol blender, in violation of a contractual undertaking imposed by the refiner on such reseller or ethanol blender designed to prevent such action, and despite reasonable efforts by the refiner (such as periodic sampling and testing) to insure compliance with such contractual obligation, or

(C) Was caused by the action of a retailer who is supplied directly by the refiner (and not by a reseller), in violation of a contractual undertaking imposed by the refiner on such retailer designed to prevent such action, and despite reasonable efforts by the refiner (such as periodic sampling and testing) to insure compliance with such contractual obligation, or

(D) Was caused by the action of a distributor or an ethanol blender subject to a contract with the refiner for transportation of gasoline from a terminal to a distributor, ethanol blender, retailer or wholesale purchaser-consumer, in violation of a contractual undertaking imposed by the refiner on such distributor or ethanol blender designed to prevent such action, and despite reasonable efforts by the refiner (such as periodic sampling and testing) to insure compliance with such contractual obligation, or

(E) Was caused by a carrier or other distributor not subject to a contract with the refiner but engaged by him for transportation of gasoline from a terminal to a distributor, ethanol blender, retailer or wholesale purchaser-consumer, despite reasonable efforts by the refiner (such as specification or inspection of equipment) to prevent such action, or

(F) Occurred at a wholesale purchaser-consumer facility: *Provided, however,* That if such wholesale purchaser-consumer was supplied by a reseller or ethanol blender, the refiner must demonstrate that the violation could not have been prevented by such reseller's compliance with a contractual undertaking imposed by the refiner on such reseller or ethanol blender as provided in paragraph (g)(4)(iii)(B) of this section.

(iv) In paragraphs (g)(4)(iii)(A) through (E) of this section, the term "was caused" means that the refiner must demonstrate by reasonably specific showings, by direct or circumstantial evidence, that the violation was caused or must have been caused by another.

(5) In any case in which a retailer or wholesale purchaser-consumer would be in violation under paragraphs (e)(1) or (f)(1) of this section, the retailer or wholesale purchaser-consumer shall not be deemed in violation if he can demonstrate that the violation was not caused by him or his employee or agent.

(6) In any case in which an ethanol blender would be in violation under paragraphs (b)(3), (c)(4), (d)(4), (e)(5) or (f)(4) of this section, the ethanol blender shall not be deemed in violation if he can demonstrate:

(i) That the violation was not caused by him or his employee or agent; and

(ii) Bills of lading, invoices, delivery tickets, loading tickets or other documents from the refiner at whose refinery the gasoline was produced, the importer at whose facility the gasoline was imported, or the carrier, reseller, or distributor from whom the gasoline was received, which represented to the ethanol blender that the gasoline to which ethanol was added was in compliance with the applicable standard when delivered to the ethanol blender; and

(iii) Evidence of an oversight program conducted by the ethanol blender, such as periodic sampling and testing of gasoline, for monitoring the volatility of gasoline that the ethanol blender sells, supplies, offers for sale or supply, or transports; and

(iv) That the gasoline determined to be in violation contained no more than 10% ethanol (by volume) when it was delivered to the next party in the distribution system.

(7) In paragraphs (g)(1)(iii), (g)(2)(i), (g)(3)(i), (g)(4)(ii), (g)(5), and (g)(6)(i) of this section the respective party must demonstrate by reasonably specific showings, by direct or circumstantial evidence, that it or its employee or agent did not cause the violation.

5. New Appendices D, E and F are added to read as follows:

Appendix D—Sampling Procedures for Fuel Volatility

1. Scope.

1.1 This method covers procedures for obtaining representative samples of gasoline for the purpose of testing for compliance with the Reid vapor pressure (RVP) standards set forth in § 80.27.

2. Summary of method.

2.1 It is necessary that the samples be truly representative of the gasoline in question. The precautions required to ensure the representative character of the samples are numerous and depend upon the tank, carrier, container or line from which the sample is being obtained, the type and cleanliness of the sample container, and the

sampling procedure that is to be used. A summary of the sampling procedures and their application is presented in Table 1. Each procedure is suitable for sampling a material under definite storage, transportation, or container conditions. The basic principle of each procedure is to obtain a sample in such manner and from such locations in the tank or other container that the sample will be truly representative of the gasoline.

3. Description of terms.

3.1 "Average sample" is one that consists of proportionate parts from all sections of the container.

3.2 "All-levels sample" is one obtained by submerging a stoppered beaker or bottle to a point as near as possible to the draw-off level, then opening the sampler and raising it at a rate such that it is 70–85% full as it emerges from the liquid. An all-levels sample is not necessarily an average sample because the tank volume may not be proportional to the depth and because the operator may not be able to raise the sampler at the variable rate required for proportionate filling. The rate of filling is proportional to the square root of the depth of immersion.

3.3 "Running sample" is one obtained by lowering an unstoppered beaker or bottle from the top of the gasoline to the level of the bottom of the outlet connection or swing line, and returning it to the top of the gasoline at a uniform rate of speed such that the beaker or bottle is 70–85% full when withdrawn from the gasoline.

3.4 "Spot sample" is one obtained at some specific location in the tank by means of a thief bottle, or beaker.

3.5 "Top sample" is a spot sample obtained 6 inches (150 mm) below the top surface of the liquid (Figure 1).

3.6 "Upper sample" is a spot sample taken at the mid-point of the upper third of the tank contents (Figure 1).

3.7 "Middle sample" is a spot sample obtained from the middle of the tank contents (Figure 1).

3.8 "Lower sample" is a spot sample obtained at the level of the fixed tank outlet or the swing line outlet (Figure 1).

3.9 "Clearance sample" is a spot sample taken 4 inches (100 mm) below the level of the tank outlet (Figure 1).

3.10 "Bottom sample" is one obtained from the material on the bottom surface of the tank, container, or line at its lowest point.

3.11 "Drain sample" is one obtained from the draw-off or discharge valve. Occasionally, a drain sample may be the same as a bottom sample, as in the case of a tank car.

3.12 "Continuous sample" is one obtained from a pipeline in such manner as to give a representative average of a moving stream.

3.13 "Mixed sample" is one obtained after mixing or vigorously stirring the contents of the original container, and then pouring out or drawing off the quantity desired.

3.14 "Nozzle sample" is one obtained from a gasoline pump nozzle which dispenses gasoline from a storage tank at a retail outlet or a wholesale purchaser-consumer facility.

4. Sample containers.

4.1 Sample containers may be clear or brown glass bottles, or cans. The clear glass bottle is advantageous because it may be examined visually for cleanliness, and also allows visual inspection of the sample for free water or solid impurities. The brown glass bottle affords some protection from light. The only cans permissible are those with the seams soldered on the exterior surface with a flux of rosin in a suitable solvent. Such a flux is easily removed with gasoline, whereas many others are very difficult to remove.

4.2 Container closure. Cork or glass stoppers, or screw caps of plastic or metal, may be used for glass bottles; screw caps only shall be used for cans to provide a vapor-tight closure seal. Corks must be of good quality, clean and free from holes and loose bits of cork. Never use rubber stoppers. Contact of the sample with the cork may be prevented by wrapping tin or aluminum foil around the cork before forcing it into the bottle. Glass stoppers must be a perfect fit. Screw caps must be protected by a cork disk faced with tin or aluminum foil, or other material that will not affect petroleum or petroleum products.

4.3 Cleaning procedure. All sample containers must be absolutely clean and free of water, dirt, lint, washing compounds, naphtha, or other solvents, soldering fluxes or acids, corrosion, rust, and oil. Before using a container, rinse it with Stoddard solvent or other naphtha of similar volatility. (It may be necessary to use sludge solvents to remove all traces of sediment and sludge from containers previously used.) Then wash the container with strong soap solution, rinse it thoroughly with tap water, and finally with distilled water. Dry either by passing a current of clean, warm air through the container or by placing it in a hot dust-free cabinet at 104 degrees Fahrenheit (40 degrees centigrade) or higher. When dry, stopper or cap the container immediately.

5. Sampling apparatus.

5.1 Sampling apparatus is described in detail under each of the specific sampling procedures. Clean, dry, and free all sampling apparatus from any substance that might contaminate the material, using the procedure described in 4.3.

6. Time and place of sampling.

6.1 When loading or discharging gasoline, take samples from both shipping and receiving tanks, and from the pipeline if required.

6.2 *Ship or barge tanks.* Sample each product after the vessel is loaded or just before unloading.

6.3 *Tank cars.* Sample the product after the car is loaded or just before unloading.

Note: When taking samples from tanks suspected of containing flammable atmospheres, precautions should be taken to guard against ignitions due to static electricity. Metal or conductive objects, such as gage tapes, sample containers, and thermometers, should not be lowered into or suspended in a compartment or tank which is being filled or immediately after cessation of pumping. A waiting period of approximately one minute will generally permit a substantial relaxation of the electrostatic charge; under certain conditions a longer period may be deemed advisable.

7. Obtaining samples.

7.1 Directions for sampling cannot be made explicit enough to cover all cases. Extreme care and good judgment are necessary to ensure samples that represent the general character and average condition of the material. Clean hands are important. Clean gloves may be worn but only when absolutely necessary, such as in cold weather, or when handling materials at high temperature, or for reasons of safety. Select wiping cloths so that lint is not introduced, contaminating samples.

7.2 As many petroleum vapors are toxic and flammable, avoid breathing them or igniting them from an open flame or a spark produced by static. Follow all safety precautions specific to the material being sampled.

7.3 When sampling relatively volatile products (more than 2 pounds (0.14 kgf/cm^2) RVP), the sampling apparatus shall be filled and allowed to drain before drawing the sample. If the sample is to be transferred to another container, this container shall also be rinsed with some of the volatile product and then drained. When the actual sample is emptied into this container, the sampling apparatus should be upended into the opening of the sample container and remain in this position until the contents have been transferred so that no unsaturated air will be entrained in the transfer of the sample.

8. Handling samples.

8.1 *Volatile samples.* It is necessary to protect all volatile samples of gasoline from evaporation. Transfer the product from the sampling apparatus to the sample container immediately. Keep the container closed except when the material is being transferred. After delivery to the laboratory, volatile samples should be cooled before the container is opened.

8.2 *Container outage.* Never completely fill a sample container, but allow adequate room for expansion, taking into consideration the temperature of the liquid at the time of filling and the probable maximum temperature to which the filled container may be subjected.

9. Shipping samples.

9.1 To prevent loss of liquid and vapors during shipment, and to protect against moisture and dust, cover the stoppers of glass bottles with plastic caps that have been swelled in water, wiped dry, placed over the tops of the stoppered bottles, and allowed to shrink tightly in place. The caps of metal containers must be screwed down tightly and checked for leakage. Postal and express office regulations applying to the shipment of flammable liquids must be observed.

10. Labeling sample containers.

10.1 Label the container immediately after a sample is obtained. Use waterproof and oilproof ink or a pencil hard enough to dent the tag, since soft pencil and ordinary ink markings are subject to obliteration from moisture, oil smearing and handling. Include the following information:

10.1.1 Date and time (the period elapsed during continuous sampling);

10.1.2 Name of the sample;

10.1.3 Name or number and owner of the vessel, car, or container;

10.1.4—Brand and grade of material; and

10.1.5—Reference symbol or identification number.

11. Sampling procedures.

11.1 The standard sampling procedures described in this method are summarized in Table 1. Alternative sampling procedures may be used if a mutually satisfactory agreement has been reached by the party(ies) involved and EPA and such agreement has been put in writing and signed by authorized officials.

11.2 Bottle or beaker sampling. The bottle or beaker sampling procedure is applicable for sampling liquids of 16 pounds (1.12 kgf/cm²) RVP or less in tank cars, tank trucks, shore tanks, ship tanks, and barge tanks.

11.2.1 *Apparatus.* A suitable sampling bottle or beaker as shown in Figure 2 is required. Recommended diameter of opening in the bottle or beaker is ¾ inch (19 mm).

11.2.2 *Procedure.*

11.2.2.1 *All-levels sample.* Lower the weighted, stoppered bottle or beaker as near as possible to the draw-off level, pull out the stopper with a sharp jerk of the cord or chain and raise the bottle at a uniform rate so that it is 70–85% full as it emerges from the liquid.

11.2.2.2 *Running sample.* Lower the unstoppered bottle or beaker as near as possible to the level of the bottom of the outlet connection or swing line and then raise the bottle or beaker to the top of the gasoline at a uniform rate of speed such that it is 70–85% full when withdrawn from the gasoline.

11.2.2.3 *Upper, middle, and lower samples.* Lower the weighted, stoppered bottle to the proper depths (Figure 1) as follows:

Upper sample.....	middle of upper third of the tank contents
Middle sample.....	middle of the tank contents
Lower sample	level of the fixed tank outlet or the swing-line outlet

At the selected level pull out the stopper with a sharp jerk of the cord or chain and allow the bottle or beaker to fill completely, as evidenced by the cessation of air bubbles. When full, raise the bottle or beaker, pour off a small amount, and stopper immediately.

11.2.2.4 *Top sample.* Obtain this sample (Figure 1) in the same manner as specified in 11.2.2.3 but at six inches (150 mm) below the top surface of the tank contents.

11.2.2.5 *Handling.* Stopper and label bottle samples immediately after taking them, and deliver to the laboratory in the original sampling bottles.

11.3 *Tap sampling.* The tap sampling procedure is applicable for sampling liquids of twenty-six pounds (1.83 kgf/cm²) RVP or less in tanks which are equipped with suitable sampling taps or lines. This procedure is recommended for volatile stocks in tanks of the breather and balloon roof type, spheroids, etc. (Samples may be taken from the drain cocks of gage glasses, if the tank is not equipped with sampling taps.) The assembly for tap sampling is shown in Figure 3.

11.3.1 *Apparatus.*

11.3.1.1 *Tank taps.* The tank should be equipped with at least three sampling taps placed equidistant throughout the tank height and extending at least three feet (0.9 meter) inside the tank shell. A standard ¼ inch pipe with suitable valve is satisfactory.

11.3.1.2 *Tube.* A delivery tube that will not contaminate the product being sampled and long enough to reach to the bottom of the sample container is required to allow submerged filling.

11.3.1.3 *Sample containers.* Use clean, dry glass bottles of convenient size and strength or metal containers to receive the samples.

11.3.2 *Procedure.* Before a sample is drawn, flush the tap (or gage glass drain cock) and line until they are purged completely. Connect the clean delivery tube to the tap. Draw upper, middle, or lower samples directly from the respective taps after the flushing operation. Stopper and label the sample container immediately after filling, and deliver it to the laboratory.

11.4 *Continuous sampling.* The continuous sampling procedure is applicable for sampling liquids of 16 pounds (1.12 kgf/cm²) RVP or less and semiliquids in pipelines, filling lines, and transfer lines. The continuous sampling may be done manually or by using automatic devices.

11.4.1 *Apparatus.*

11.4.1.1 *Sampling probe.* The function of the sampling probe is to withdraw from the flow stream a portion that will be representative of the entire stream. The apparatus assembly for continuous sampling is shown in Figure 4. Probe designs that are commonly used are as follows:

11.4.1.1.1 A tube extending to the center of the line and beveled at a 45 degree angle facing upstream (Figure 4(a)).

11.4.1.1.2 A long-radius forged elbow or pipe bend extending to the center line of the pipe and facing upstream. The end of the probe should be reamed to give a sharp entrance edge (Figure 4(b)).

11.4.1.1.3 A closed-end tube with a round orifice spaced near the closed end which should be positioned in such a way that the orifice is in the center of the pipeline and is facing the stream as shown in Figure 4(c)).

11.4.1.2 *Probe location.* Since the fluid to be sampled may not in all cases be homogeneous, the location, the position and the size of the sampling probe should be such as to minimize stratification or dropping out of heavier particles within the tube or the displacement of the product within the tube as a result of variation in gravity of the flowing stream. The sampling probe should be located preferably in a vertical run of pipe and as near as practicable to the point where the product passes to the receiver. The probe should always be in a horizontal position.

11.4.1.2.1 The sampling lines should be as short as practicable and should be cleared before any samples are taken.

11.4.1.2.2 Where adequate flowing velocity is not available, a suitable device for mixing the fluid flow to ensure a homogeneous mixture at all rates of flow and to eliminate stratification should be installed upstream of the sampling tap. Some effective devices for obtaining a homogeneous mixture are as follows: Reduction in pipe size; a series of baffles; orifice or perforated plate; and a combination of any of these methods.

11.4.1.2.3 The design or sizing of these devices is optional with the user, as long as the flow past the sampling point is homogeneous and stratification is eliminated.

11.4.1.3 To control the rate at which the sample is withdrawn, the probe or probes should be fitted with valves or plug cocks.

11.4.1.4 Automatic sampling devices that meet the standards set out in 11.4.1.5 may be used in obtaining samples of gasoline. The quality of sample collected must be of sufficient size for analysis, and its composition should be identical with the composition of the batch flowing in the line while the sample is being taken. An automatic sampler installation necessarily includes not only the automatic sampling device that extracts the samples from the line, but also a suitable probe, connecting lines, auxiliary equipment, and a container in which the sample is collected. Automatic samplers may be classified as follows:

11.4.1.4.1 Continuous sampler, time cycle (nonproportional) type. A sampler designed and operated in such a manner that it transfers equal increments of liquid from the pipeline to the sample container at a uniform rate of one or more increments per minute is a continuous sampler.

11.4.1.4.2 Continuous sampler, flow-responsive (proportional) type. A sampler that is designed and operated in such a manner that it will automatically adjust the quantity of sample in proportion to the rate of flow is a flow-responsive (proportional) sampler. Adjustment of the quantity of sample may be made either by varying the frequency of transferring equal increments of sample to the sample container, or by varying the volume of the increments while maintaining a constant frequency of transferring the increments to the sample container. The apparatus assembly for continuous sampling is shown in Figure 4.

11.4.1.4.3 *Intermittent sampler.* A sampler that is designed and operated in such a manner that it transfers equal increments of liquid from a pipeline to the sample container at a uniform rate of less than one increment per minute is an intermittent sampler.

11.4.1.5 *Standards of installation.* Automatic sampler installations should meet all safety requirements in the plant or area where used, and should comply with American National Standard Code for Pressure Piping, and other applicable codes (ANSI B31.1). The sampler should be so installed as to provide ample access space for inspection and maintenance.

11.4.1.5.1 Small lines connecting various elements of the installation should be so arranged that complete purging of the automatic sampler and of all lines can be accomplished effectively. All fluid remaining in the sampler and the lines from the preceding sampling cycle should be purged immediately before the start of any given sampling operation.

11.4.1.5.2 In those cases where the sampler design is such that complete purging

of the sampling lines and the sampler is not possible, a small pump should be installed in order to circulate a continuous stream from the sampling tube past or through the sampler and back into the line. The automatic sampler should then withdraw the sample from the sidestream through the shortest possible connection.

11.4.1.5.3 Under certain conditions, there may be a tendency for water and heavy particles to drop out in the discharge line from the sampling device and appear in the sample container during some subsequent sampling period. To circumvent this possibility, the discharge pipe from the sampling device should be free of pockets or enlarged pipe areas, and preferably should be pitched downward to the sample container.

11.4.1.5.4 To ensure clean, free-flowing lines, piping should be designed for periodic cleaning.

11.4.1.6 *Field calibration.* Composite samples obtained from the automatic sampler installation should be verified for quantity performance in a manner that meets with the approval of all parties concerned (including EPA), at least once a month and more often if conditions warrant. In the case of time-cycle samplers, deviations in quantity of the sample taken should not exceed ± five percent for any given setting. In the case of flow-responsive samplers, the deviation in quantity of sample taken per 1,000 barrels of flowing stream should not exceed ± five percent. For the purpose of field-calibrating an installation, the composite sample obtained from the automatic sampler under test should be verified for quality by comparing on the basis of physical and chemical properties, with either a properly secured continuous nonautomatic sample or tank sample. The tank sample should be taken under the following conditions:

11.4.1.6.1 The batch pumped during the test interval should be diverted into a clean tank and a sample taken within one hour after cessation of pumping.

11.4.1.6.2 If the sampling of the delivery tank is to be delayed beyond one hour, then the tank selected must be equipped with an adequate mixing means. For valid comparison, the sampling of the delivery tank must be completed within eight hours after cessation of pumping, even though the tank is equipped with a motor-driven mixer.

11.4.1.6.3 When making a normal full-tank delivery from a tank, a properly secured sample may be used to check the results of the sampler if the parties (including EPA) mutually agree to this procedure.

11.4.1.7 *Receiver.* The receiver must be a clean, dry container of convenient size to receive the sample. All connections from the sample probe to the sample container must be free of leaks. Two types of containers may be used, depending upon service requirements.

11.4.1.7.1 *Atmospheric container.* The atmospheric container shall be constructed in such a way that it retards evaporation loss and protects the sample from extraneous material such as rain, snow, dust, and trash. The construction should allow cleaning, interior inspection, and complete mixing of the sample prior to removal. The container should be provided with a suitable vent.

11.4.1.7.2 *Closed container.* The closed container shall be constructed in such a manner that it prevents evaporation loss. The construction must allow cleaning, interior inspection and complete mixing of the sample prior to removal. The container should be equipped with a pressure-relief valve.

11.4.2 *Procedure.*

11.4.2.1 *Nonautomatic sample.* Adjust the valve or plug cock from the sampling probe so that a steady stream is drawn from the probe. Whenever possible, the rate of sample withdrawal should be such that the velocity of liquid flowing through the probe is approximately equal to the average linear velocity of the stream flowing through the pipeline. Measure and record the rate of sample withdrawal as gallons per hour. Divert the sample stream to the sampling container continuously or intermittently to provide a quantity of sample that will be of sufficient size for analysis.

11.4.2.2 *Automatic sampling.* Purge the sampler and the sampling lines immediately before the start of a sampling operation. If the sample design is such that complete purging is not possible, circulate a continuous stream from the probe past or through the sampler and back into the line. Withdraw the sample from the side stream through the automatic sampler using the shortest possible connections. Adjust the sampler to deliver not less than one and not more than 40 gallons (151 liters) of sample during the desired sampling period. For time-cycle samplers, record the rate at which sample increments were taken per minute. For flow-responsive samplers, record the proportion of sample to total stream. Label the samples and deliver them to the laboratory in the containers in which they were collected.

11.5 *Nozzle sampling.* The nozzle sampling procedure is applicable for sampling gasoline from a retail outlet or wholesale purchaser-consumer facility storage tank.

11.5.1 *Apparatus.* Sample containers conforming with 4.1 should be used. A spacer, if appropriate, and a nozzle extension as shown in Figures 6 and 7 shall be used when nozzle sampling.

11.5.2 *Procedure.* Immediately after gasoline has been delivered from the pump and the pump has been reset, deliver a small amount of product into the sample container, using a spacer (Figure 6), if needed, on the pump nozzle (vapor recovery type). Rinse sample container and dump product into waste container. Insert nozzle extension (Figure 7) into sample container and insert pump nozzle into extension with slot over air bleed hole. Fill sample container slowly through nozzle extension to 70–80 percent full (Figure 8). Remove nozzle extension. Cap sample container at once. Check for leaks. Discard sample container and resample if leak occurs. If sample container is leak tight, label the container and deliver it to the laboratory.

12. Special Precautions and Instructions.

12.1 *Precautions.* Vapor pressures are extremely sensitive to evaporation losses and to slight changes in composition. When obtaining, storing, or handling samples, observe the necessary precautions to ensure samples representative of the product and satisfactory for RVP tests. Official samples should be taken by, or under the immediate supervision of, a person of judgment, skill, and sampling experience. Never prepare composite samples for this test. Make certain that containers which are to be shipped by common carrier conform to applicable Interstate Commerce Commission, state, and local regulations. When flushing or purging lines or containers, observe the pertinent regulations and precautions against fire, explosion, and other hazards.

12.2 *Sample containers.* Use containers of not less than one quart (0.9 liter) nor more than two gallons (7.6 liters) capacity, of sufficient strength to withstand the pressures to which they may be subjected, and of a type that will permit replacement of the cap or stopper with suitable connections for transferring the sample to the gasoline chamber of the vapor pressure apparatus. Open-type containers have a single opening which permits sampling by immersion. Closed-type containers have two openings, one in each end (or the equivalent thereof), fitted with valves suitable for sampling by water displacement or by purging.

12.3 *Transfer connections.* The transfer connection for the open-type container consists of an air tube and a liquid delivery tube assembled in a cap or stopper. The air tube extends to the bottom of the container. One end of the liquid delivery tube is flush with the inside face of the cap or stopper and the tube is long enough to reach the bottom of the gasoline chamber while the sample is being transferred to the chamber. The transfer connection for the closed-type container consists of a single tube with a connection suitable for attaching it to one of the openings of the sample container. The tube is long enough to reach the bottom of the gasoline chamber while the sample is being transferred.

12.4 *Sampling open tanks.* Use clean containers of the open type when sampling open tanks and tank cars. An all-level sample obtained by the bottle procedure described in 11.2 is recommended. Before taking the sample, flush the container by immersing it in the product to be sampled. Then obtain the sample immediately. Pour off enough so that the container will be 70–80 percent full and close it promptly. Label the container and deliver it to the laboratory.

12.5 *Sampling closed tanks.* Containers of the closed type may be used to obtain samples from closed or pressure tanks. Obtain the sample using the water displacement procedure described in 12.6 or the purging procedure described in 12.7. The water displacement procedure is preferable because the flow of product involved in the purging procedure may be hazardous.

12.6 *Water displacement procedure.* Completely fill the closed-type container with water and close the valves. The water should be at the same temperature or lower than that of the product to be sampled. While permitting a small amount of product to flow through the fittings, connect the top or inlet valve of the container to the tank sampling tap or valve. Then open all valves on the inlet side of the container. Open the bottom or

outlet valve slightly to allow the water to be displaced slowly by the sample entering the container. Regulate the flow so that there is no appreciable change in pressure within the container. Close the outlet valve as soon as gasoline discharges from the outlet; then in succession close the inlet valve and the sampling valve on the tank. Disconnect the container and withdraw enough of the contents so that it will be 70–80 percent full. If the vapor pressure of the product is not high enough to force liquid from the container, open both the upper and lower valves slightly to remove the excess. Promptly seal and label the container, and deliver it to the laboratory.

12.7 Purging procedure. Connect the inlet valve of the closed-type container to the tank sampling tap or valve. Throttle the outlet valve of the container so that the pressure in it will be approximately equal to that in the container being sampled. Allow a volume of product equal to at least twice that of the container to flow through the sampling system. Then close all valves, the outlet valve first, the inlet valve of the container second, and the tank sampling valve last, and disconnect the container immediately. Withdraw enough of the contents so that the sample container will be 70–80 percent full. If the vapor pressure of the product is not high enough to force liquid from the container, open both the upper and lower valves slightly to remove the excess. Promptly seal and label the container, and deliver it to the laboratory.

TABLE 1.—SUMMARY OF GASOLINE SAMPLING PROCEDURES AND APPLICABILITY

Type of container	Procedure	Paragraph
Storage tanks, ship and barge tanks, tank cars, tank trucks.	Bottle sampling.	11.2
Storage tanks with taps.	Tap sampling.	11.3
Pipes and lines	Continuous line sampling.	11.4
Retail outlet and whole-sale purchaser-consumer facility storage tanks.	Nozzle sampling.	11.5

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-43a-

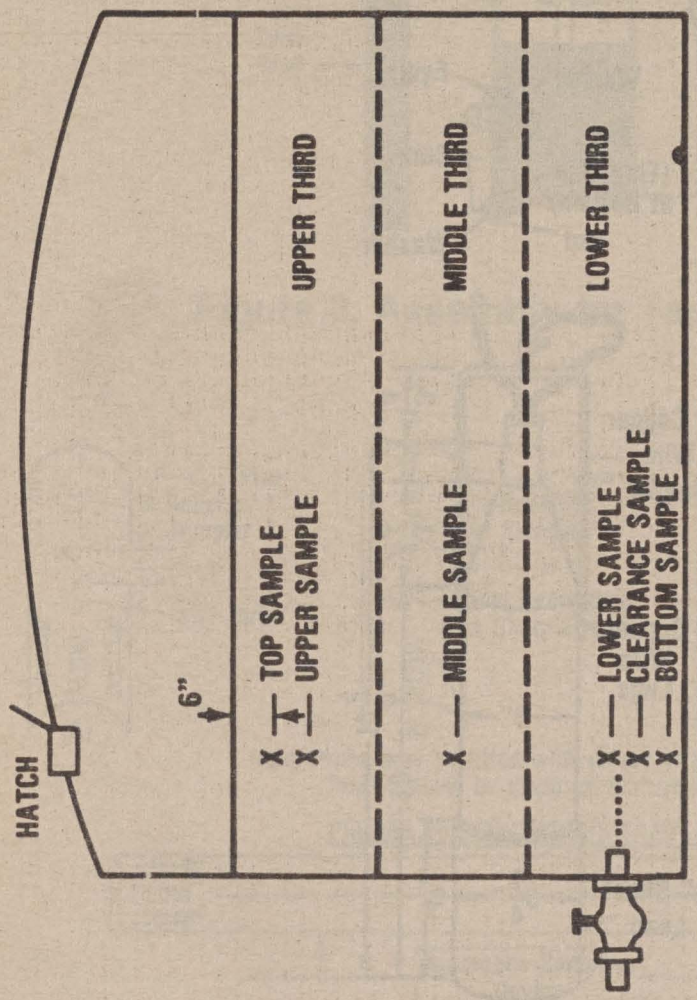
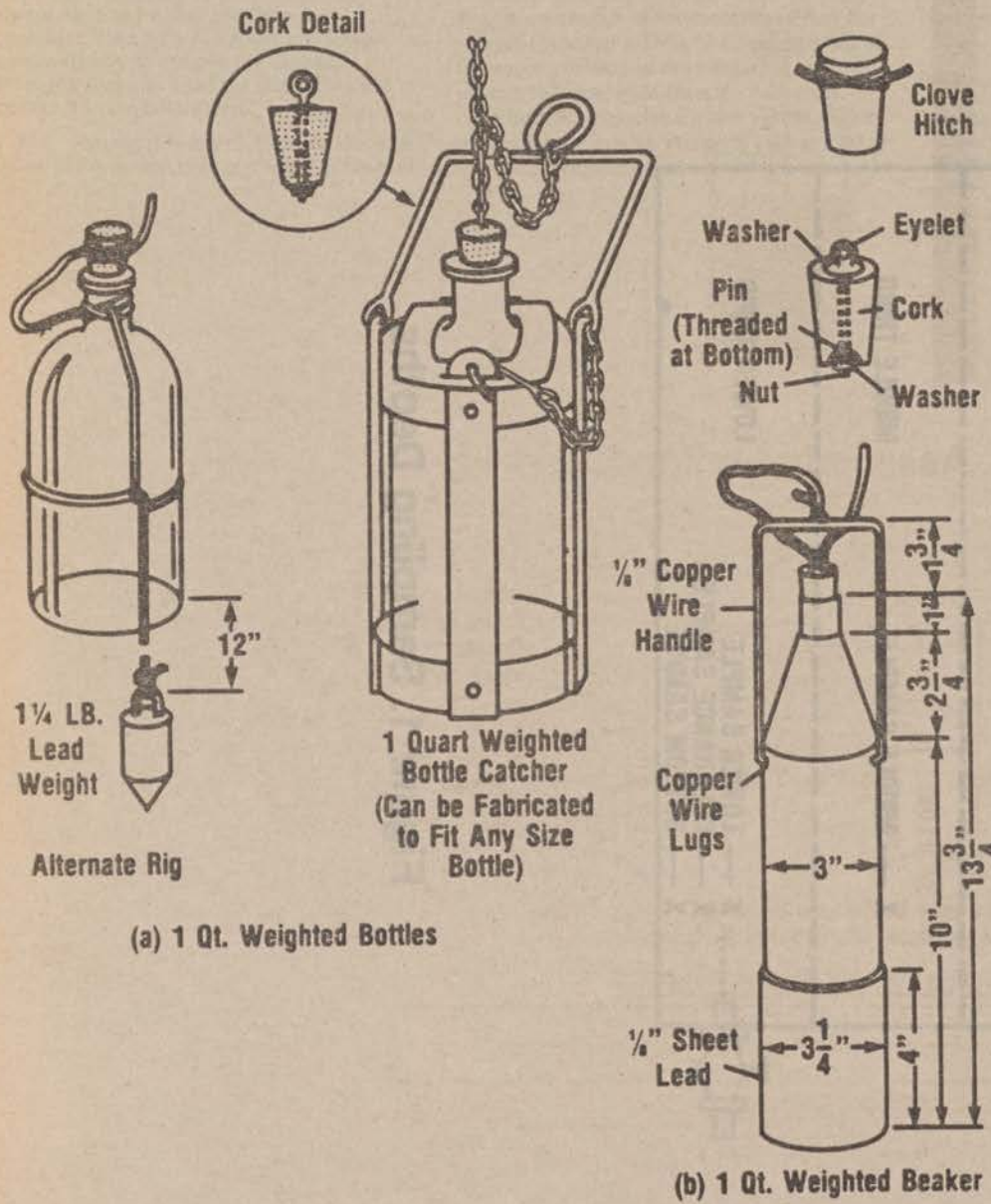


Figure 1. Sampling Depths

-43b-



(a) 1 Qt. Weighted Bottles

(b) 1 Qt. Weighted Beaker

METRIC EQUIVALENTS

in.	⅛	1	1¾	2¾	3¼	4	10	12	13¾
mm	3	25	45	70	83	102	250	300	350

Figure 2. Assembly for Bottle Sampling

-43c-

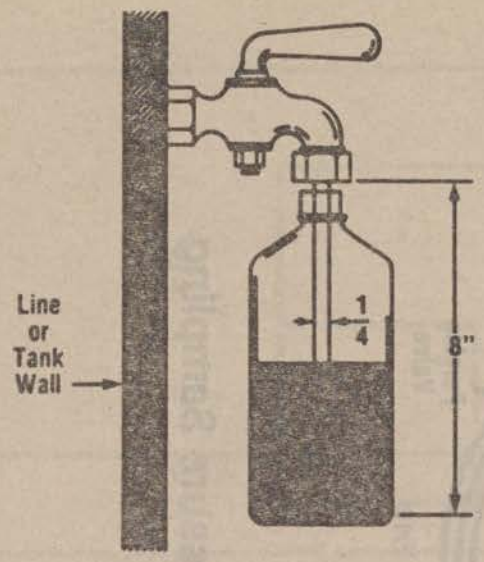


Figure 3. Assembly for Tap Sampling

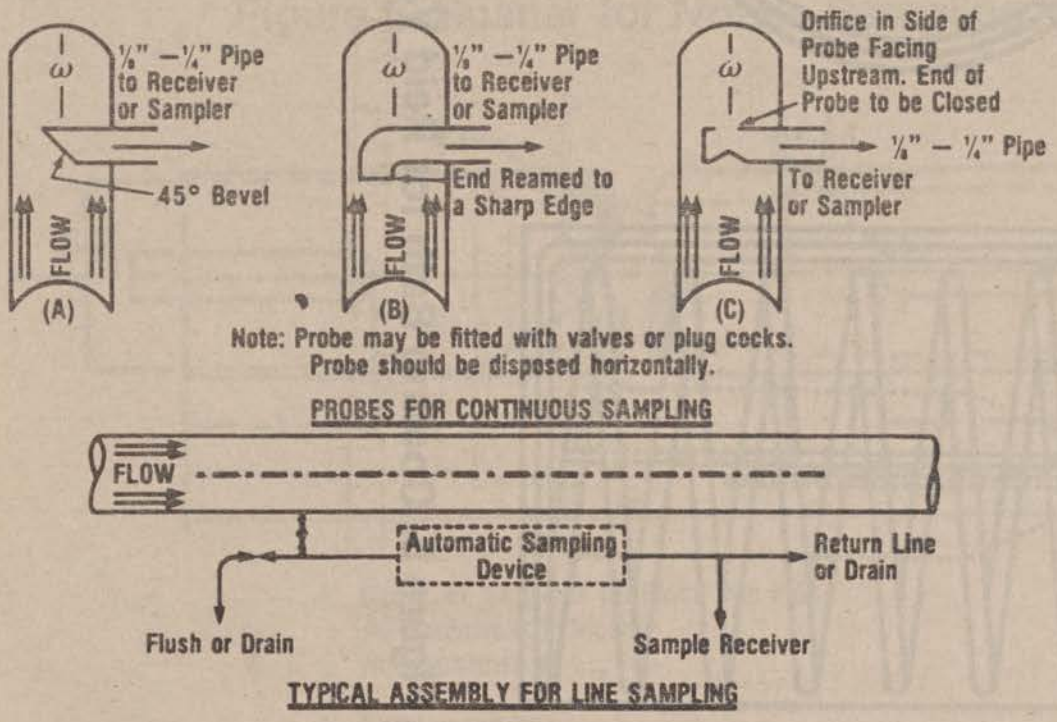


Figure 4. Probes for Continuous Sampling

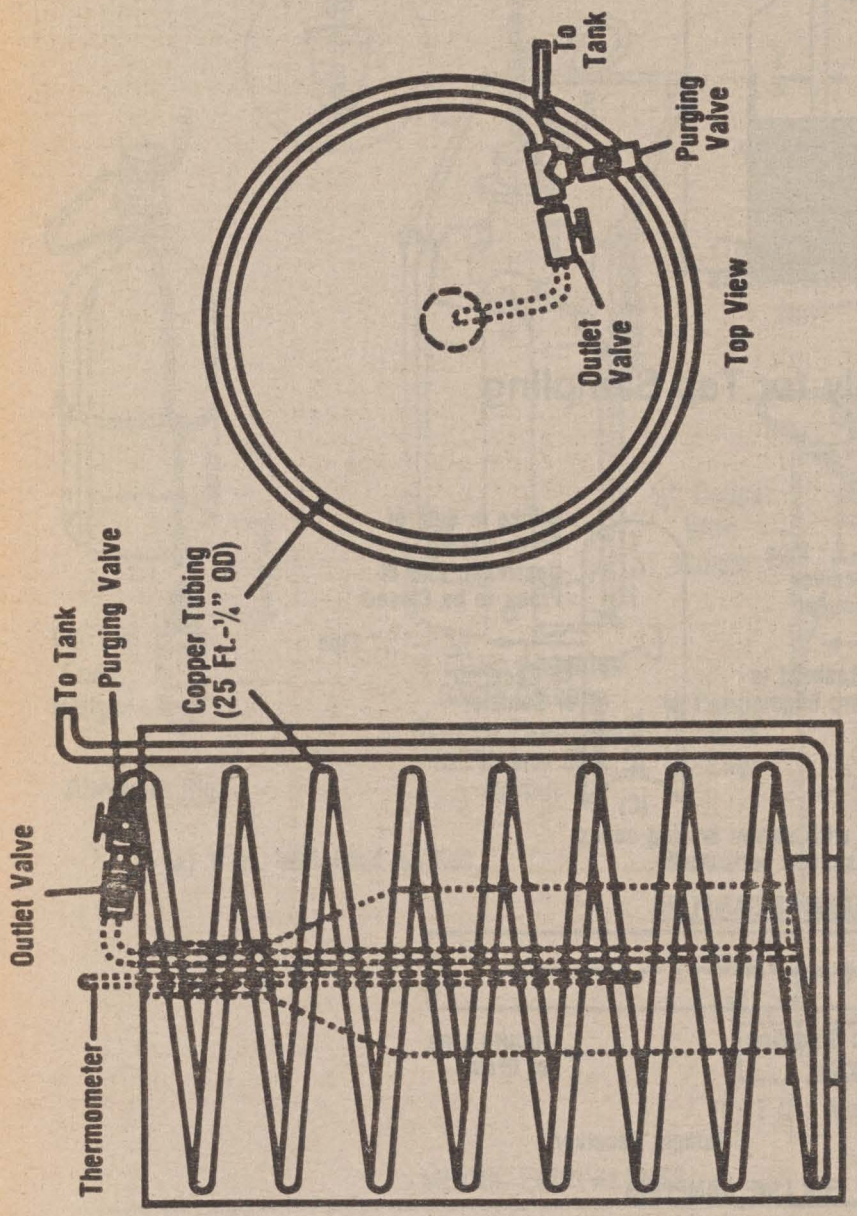
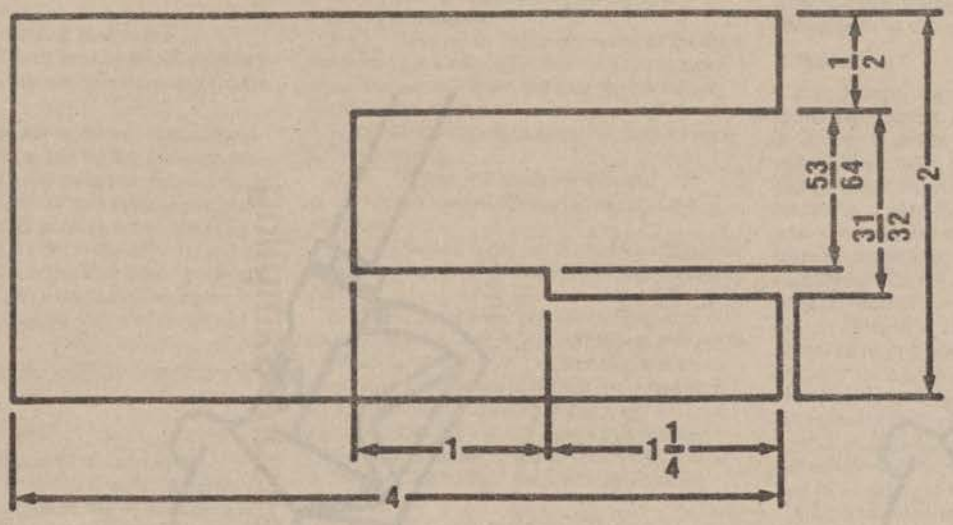


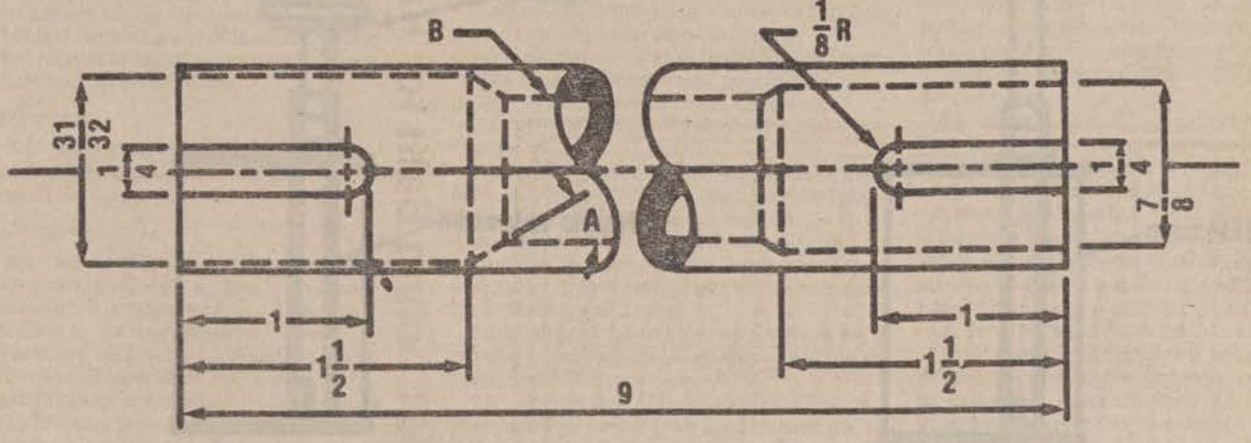
Figure 5. Cooling Bath for Reid Vapor Pressure Sampling

-43e-



Make from ¼ inch flat steel
All dimensions in inches
Break all edges and corners

Figure 6. Spacer for Nozzle Sampling

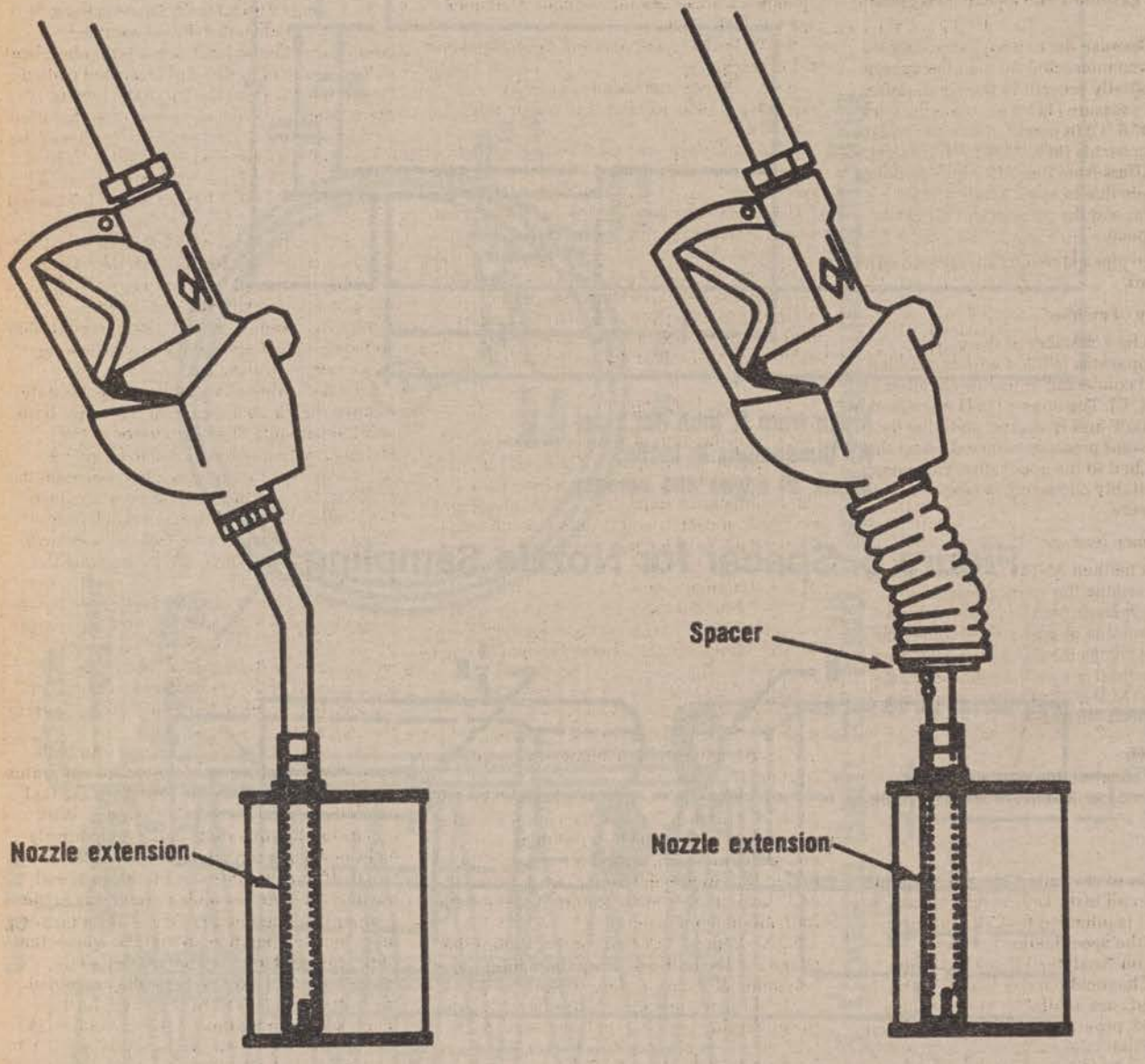


Use ¼ in. Schedule 80 Black Iron Pipe
All dimensions in inches
All tolerances ± 1/128

A—Recommend 30°
B—Inside Diameter Schedule 80 Black Iron Pipe

Figure 7. Nozzle Extension for Nozzle Sampling

-43f-



(a) Nozzle without vapor recovery

(b) Nozzle with vapor recovery

Figure 8. Assembly for Nozzle Sampling

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Appendix E—Tests for Determining Reid Vapor Pressure (RVP) of Gasoline and Gasoline-Oxygenate Blends

Method 1—Dry RVP Measurement Method.

1. Scope.

1.1 This test method covers the determination of the absolute vapor pressure (Note 1) of gasolines and gasoline-oxygenate blends.

Note 1: Because the external atmospheric pressure is counteracted by the atmospheric pressure initially present in the air chamber, the "vapor pressure" is an absolute pressure at 100 °F (37.8 °C) in pounds-force per square inch or kilopascals (kPa=kN/m²). This vapor pressure differs from the true vapor pressure of the sample due to some small sample vaporization and the presence of air in the confined space.

1.2 The values stated in inch-pound units are standard.

2. Summary of method.

2.1 The fuel chamber of the vapor pressure apparatus is filled with the chilled sample and connected to the air chamber at 100 °F (37.8 °C). The apparatus is immersed in a bath at 100°F and is shaken periodically until a constant pressure is observed on the gauge attached to the apparatus. The gauge reading, suitably corrected, is reported as the vapor pressure.

3. Significance and use.

3.1 Test method ASTM D-323 cannot be used to determine the vapor pressure of gasoline-oxygenate blends which contain water-extractable oxygenates because the fuel sample comes into contact with water. This test method is a modification of Test Method ASTM D-323 where contact with water has been eliminated.

4. Apparatus.

4.1 The construction of the required apparatus is described in Annex A1.1 of this Appendix.

5. Reagents.

5.1 Purity of reagents. Use reagent grade chemicals in all tests. Unless otherwise indicated, it is intended that all reagents conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society where such specifications are available. Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

5.2 Acetone (Danger—Extremely flammable. See Annex A3).

5.3 Naphtha (Danger-Extremely flammable. See Annex A2).

6. Handling of samples.

6.1 The extreme sensitivity of vapor pressure measurements to losses through evaporation and the resulting changes in composition is such as to require the utmost precaution and the most meticulous care in the handling of samples. The provisions of this section apply to all samples for vapor pressure determinations.

6.2 Sample in accordance with 40 CFR Part 80, Appendix D.

6.3 Sample container size. The size of the sample container from which the vapor pressure sample is taken is 1 quart (1 liter). It will be 70 to 85% filled with the sample.

6.4 Precautions.

6.4.1 Determine vapor pressure as the first test run on a sample. Do not withdraw more than one sample from the sample container for this test.

6.4.2 Protect samples from excessive heat prior to testing.

6.4.3 Do not test samples in leaky containers. Discard them and obtain new samples.

6.4.4 Discard samples that have separated into two phases and obtain new samples (see Note 4).

6.4.5 Sample handling temperature. In all cases, cool the sample container and contents to 32 to 34 °F (0 to 1 °C) before the container is opened. To ensure sufficient time to reach this temperature, directly measure the temperature of a similar liquid at a similar initial temperature in a like container placed in the cooling bath at the same time as the sample.

7. Preparation for test.

7.1 Verification of sample container filling. With the sample at a temperature of 32 to 34 °F (0 to 1 °C), take the container from the cooling bath, wipe dry with an absorbent material, unseal it, and examine its ullage. The sample content, as determined by use of a suitable gauge, must be equal to 70 to 80% of the container capacity.

7.1.1 Discard the sample if its volume is less than 70% of the container capacity.

7.1.2 If the container is more than 80% full, pour out enough sample to bring the container contents within the 70 to 80% range. Under no circumstance may any sample poured out be returned to the container.

7.2 Air saturation of sample in sample container.

7.2.1 With the sample at a temperature of 32 to 34 °F (0 to 1 °C) take the container from the cooling bath, wipe it dry with an absorbent material, unseal it momentarily, taking care to prevent water entry, reseal it, and shake it vigorously. Return it to the bath for a minimum of 2 minutes.

7.2.2 Repeat 7.2.1 twice more. Return the sample to the bath and keep there until the beginning of the procedure (8.1).

7.3 Preparation of fuel chamber. Observe the apparatus preparation procedure of 8.5, then store the stoppered fuel chamber and the sample transfer connection in a refrigerator or ice-water bath for a sufficient time to allow the chamber and the connection to reach a temperature of 32 to 34 °F (0 to 1 °C). If an ice-water bath is used, keep the chamber upright, corked, and not immersed over the top of the coupling threads. The transfer connection is inserted into a plastic bag to keep it completely dry during cooling.

7.4 Preparation of air chamber. Observe the apparatus preparation procedure of 8.5. Connect the gage to the air chamber and close the lower opening securely with a dry No. 6½ rubber stopper. Make sure the stopper is inserted far enough to securely close the vent hole in the air chamber connection. Immerse the air chamber to at least 1 inch (25 mm.) above its top in the water bath maintained at 100 ± 0.2 °F (37.8 ± 0.1 °C) for not less than 20 minutes. Do not remove the air chamber from the water bath until the fuel chamber has been filled with the sample as described in 8.1.

8. Procedure

8.1 Sample transfer. With everything in readiness, remove the chilled sample container from the bath, dry it with absorbent material, uncap it, dry and insert the chilled transfer apparatus (see Fig. 1.1). Quickly place the chilled fuel chamber, in an inverted position, over the sample delivery tube of the transfer apparatus. Invert the entire system rapidly so that the fuel chamber is upright, with the end of the delivery tube touching the botton of the fuel chamber. Fill the fuel chamber to overflowing. Withdraw the delivery tube from the fuel chamber while allowing the sample to continue flowing up to the moment of complete withdrawal.

8.1.1 Caution. Make provision for suitable collection and disposal of the overflowing fuel to avoid fire hazard.

8.2 Assembly of apparatus. Immediately remove the air chamber from the water bath and immediately dry the exterior of the chamber with absorbent material, giving particular care to the connection between the air chamber and the fuel chamber. Remove the stopper after drying and immediately couple the two chambers. Not more than 10 seconds shall be consumed in coupling the two chambers.

Note 2: When the air chamber is removed from the water bath, is dried, and the stopper is removed, connect it to the fuel chamber without undue movements through the air, which could promote exchange of room temperature air with the 100 °F (37.8 °C) air in the chamber.

8.3 Introduction of apparatus into bath. Turn the assembled vapor pressure apparatus upside down to allow the sample in the fuel chamber to run into the air chamber. With apparatus still inverted, shake it vigorously eight times in a direction parallel to the length of the apparatus. With the gage end up, immerse the assembled apparatus in the bath, maintained at 100±0.2 °F (37.8±0.1 °C), in an inclined position so that the connection of the fuel and air chambers is below the water level and may be carefully examined for leaks. If no leaks are observed, further immerse the apparatus to at least 1 inch (25 mm.) above the top of the air chamber. Observe the apparatus for leakage throughout the test. Discard the test at any time a leak is detected.

Note 3: Liquid leaks are more difficult to detect than vapor leaks; because the coupling between the chambers is normally in the liquid section of the apparatus, give the coupling particular attention.

Note 4: After the apparatus has been immersed in the bath, check the remaining sample for phase separation. If the sample is contained in a glass container, this observation can be made prior to sample transfer (8.1). If the sample is contained in a non-transparent container, shake the sample vigorously for 5 seconds and then

immediately pour a portion of the remaining sample into a clear glass container. Immediately after shaking this sample again for 5 seconds, observe the sample for phase separation. If this sample is not clear and bright, and free of a second phase, discard the test and the sample.

8.4 Measurement of vapor pressure. After the assembled vapor pressure apparatus has been immersed in the bath for at least 5 minutes, tap the pressure gage lightly and observe the reading. Withdraw the apparatus from the bath and repeat 8.3. At intervals of not less than 2 minutes, perform 8.3 until a total of not less than five shakings and gage readings have been made; continue thereafter, if necessary, until the last two consecutive gage readings are constant, indicating equilibrium attainment. These operations normally require 20 to 30 minutes. Read the final gage pressure to the nearest 0.05 psi (0.25 kPa) for gages with intermediate graduations of 0.1 psi (0.5 kPa) or less and to the nearest 0.1 psi for gages with graduations of 0.2 to 0.5 psi (1.0 to 2.5 kPa), and record the value as the "uncorrected vapor pressure" of the sample. Without undue delay remove the pressure gage and, without attempting to remove any liquid which may be trapped in the gage, check its reading against that of the manometer while both are subjected to a common steady pressure which is no more than 0.2 psi (1.0 kPa) different from the recorded "uncorrected vapor pressure". If a difference is observed between the gage and manometer readings, the difference shall be added to or subtracted from the "uncorrected vapor pressure" recorded for the sample being tested, and the resulting value shall be recorded as the vapor pressure of the sample.

Note 5: Cooling the assembly prior to disconnecting the gage will facilitate disassembly and reduce the amount of hydrocarbon vapors released in the room.

Note 6: Verification of Sample Integrity. Disconnect the air chamber from the fuel chamber. Drain the sample from the air and fuel chambers as completely as possible into a dry 8-ounce clear glass bottle. Seal the bottle and shake it vigorously for 5 seconds. If the sample is clear and bright and free of a second phase, note this observation and record that the test is valid. If the sample is not clear and bright and free of a second phase, immerse the bottle in the 100 °F (37.8 °C) water bath up to about 1 inch (25 mm.) above the top of the sample level for 15 minutes in order to heat the sample to the test temperature. Remove the sample from the water bath and immediately shake it vigorously for 5 seconds and observe the sample. If the sample is not clear and bright and free of a second phase, note this observation and record that the test is not valid because of phase separation. A fuel that is not clear and bright and free of a second phase at this point of the test indicates that the fuel was contacted with sufficient water to exceed the water tolerance of the fuel during the test procedure. Water can most likely get into the test chambers during preparation of the fuel and air chambers (7.3 and 7.4) or assembly of the air and fuel chambers (8.2), or both, especially if water baths are used for these procedures.

8.5 Preparation of apparatus for next test. Thoroughly purge the air chamber of residual sample by filling it with warm water above 90 °F (32 °C) and allowing it to drain (Note 5). Repeat this purging at least five times. After disconnecting the pressure gage from its manifold connection with the manometer, remove trapped fluid in the Bourdon tube of the gage by repeated centrifugal thrusts. This may be accomplished in the following manner: hold the gage between the palms of the hands with the right hand on the face side and the threaded connection of the gage forward. Extend the arms forward and upward at an angle of 45° with the coupling of the gage pointing in the same direction. Swing the arms downward through an arc of about 135° so that the centrifugal force aids gravity in removing the trapped liquid. Repeat this operation three times to expel all liquid. Purge the pressure gage by directing a small jet of air into its Bourdon tube for at least 5 minutes. Rinse both chambers and the sample transfer connection several times with hot water, then several times with acetone, then dry by blowing dried air or pulling a vacuum. Stopper the fuel chamber and place it in the refrigerator or ice-water bath for the next test.

Note 7: If the purging of the air chamber is done in a bath, be sure to avoid small and unnoticeable films of floating sample by keeping the bottom and top openings of the chamber closed as they pass through the water surface.

9. Precautions

9.1 Gross errors can be obtained in vapor pressure measurements if the prescribed procedure is not followed carefully. The following list emphasizes the importance of strict adherence to the precautions given in the procedure.

9.1.1 Checking the pressure gage. Check all gages against a manometer after each test in order to ensure high precision of results (8.4). Read all gages while the gages are in a vertical position and after tapping them lightly.

9.1.2 Shake the container vigorously to ensure equilibrium of the sample with the air in the container (7.2).

9.1.3 Checking for leaks. Check the apparatus before and during each test for both liquid and vapor leaks (Annex A1.1.6 to this Appendix and Note 3).

9.1.4 Check O-rings before each test for cracking and clean if necessary.

9.1.5 *Sampling.* Because initial sampling and the handling of samples will greatly affect the final results, employ the utmost precaution and the most meticulous care to avoid losses through evaporation and even slight changes in composition (6.5 and 8.1). In no case shall any part of the apparatus itself be used as the sample container previous to actually conducting the test.

9.1.6 *Purging the apparatus.* Thoroughly purge the pressure gage, the fuel chamber and the air chamber to be sure they are free of residual sample. (This is most conveniently done at the end of the previous test. See 8.5). It is important to remove all water from the apparatus before cooling the gasoline chambers and heating the air chamber. In high-humidity conditions be alert for and avoid condensation on the transfer connection and interior walls of the apparatus.

9.1.7 *Coupling the apparatus.* Carefully observe the requirements of 8.2.

9.1.8 *Shaking the apparatus.* Shake the apparatus "vigorously" as directed in 8.3 in order to ensure equilibrium.

10. Report.

10.1 *Reporting results.* Report to the nearest 0.05 psi (0.25 kPa) or 0.1 psi (0.5 kPa) the gage result observed in 8.4, after correcting for any difference between the gage and manometer, as the "vapor pressure" in pounds-force per square inch (or kilopascals) without reference to temperature.

11. Precision and Accuracy

11.1 *Precision.* The precision of this test method has not been determined.

11.2 *Accuracy.* The accuracy of this test method has not been determined.

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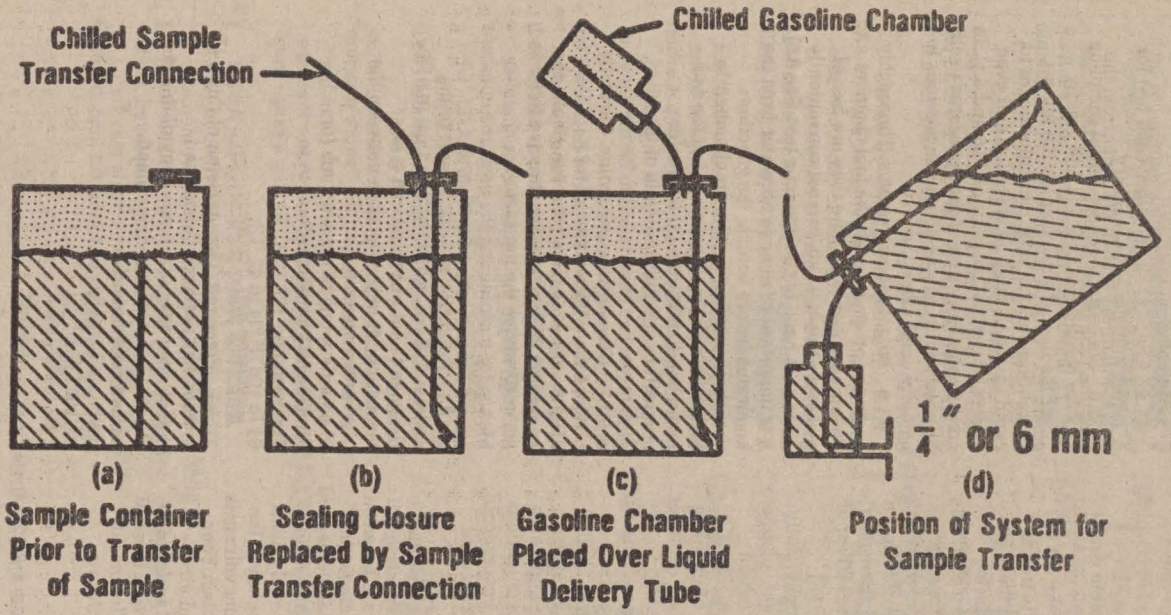

Figure 1.1 Simplified Sketches Outlining Method of Transferring Samples of Gasoline Chamber from Open-Type Containers

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Annex A1. Apparatus for Reid Vapor Pressure Test

A1.1 Reid Vapor Pressure Bomb, consisting of two chambers, an air chamber (upper section) and a gasoline chamber (lower section) shall conform to the following requirements:

Note A1.1: Caution—To maintain the correct volume ratio between the air chamber and the gasoline chamber, the units shall not be interchanged without recalibrating to ascertain that the volume ratio is within satisfactory limits.

A1.1.1 Air Chamber—The upper section or air chamber, as shown in Fig. A1.1, shall be a cylindrical vessel 2±⅛ inches (51±3 mm.) in diameter and 10±⅛ inches (254±3 mm.) in length, inside dimensions, with the inner surfaces of the ends slightly sloped to provide complete drainage from either end when held in a vertical position. On one end of the air chamber, a suitable gage coupling with an internal diameter not less than 3/16 inch shall be provided to receive the ¼ inch gage connection. In the other end of the air chamber an opening approximately ½ inch in diameter shall be provided for coupling with the gasoline chamber. Care shall be taken that the connections to the end openings do not prevent the chamber from draining completely.

A1.1.2 Gasoline Chamber (One-Opening)—The lower section or gasoline chamber, as shown in Fig. A1.1, shall be a cylindrical vessel of the same inside diameter as the air chamber and of such volume that the ratio of the volume of the air chamber to the volume of gasoline chamber shall be between the limits of 3.8 and 4.2. In one end of the gasoline chamber an opening approximately ½ inch in diameter shall be provided for coupling with the air chamber. The inner surface of the end containing the coupling member shall be sloped to provide complete drainage when inverted. The other end of the gasoline chamber shall be completely closed.

A1.1.3 Gasoline Chamber (Two-Opening)—For sampling from closed vessels, the lower section or gasoline chamber, as shown in Fig. A1.1 shall be essentially the same as the gasoline chamber described in A1.1.2, except that a ¼ inch valve shall be attached near the bottom of the gasoline chamber and a ½ inch straight-through, full-opening valve shall be introduced in the coupling between the chambers. The volume of the gasoline chamber, including only the capacity enclosed by the valves, shall fulfill the volume ratio requirements as set forth in A1.1.2.

Note A1.2: In determining capacities for the two-opening gasoline chamber (Fig. A1.1), the capacity of the gasoline chamber shall be considered as that below the ½ inch valve closure. The volume above the ½ inch valve closure, including the portion of the coupling permanently attached to the gasoline chamber, shall be considered as a part of the air chamber capacity.

A1.1.4 Method of Coupling Air and Gasoline Chambers—Any method of coupling the air and gasoline chambers may be employed, provided that no gasoline is lost during the coupling operation, that no compression effect is caused by the act of coupling, and that the assembly is free of leaks under the conditions of the tests. To avoid displacement of gasoline during assembly, it is desirable that the male fitting of a suitable coupling be on the gasoline chamber. To avoid compression of air during the assembly of a suitable screw coupling, a vent hole may be used to ensure atmospheric pressure in the air chamber at the instant of sealing.

Note A1.3: Caution—Some commercially available equipment does not make adequate provision for avoiding air compression effects. Before employing any apparatus, it shall be established that the act of coupling does not compress the air in the air chamber. This may be accomplished by tightly stoppering the gasoline chamber opening and assembling the apparatus in the normal manner, utilizing the 0 to 5-psi (0 to 35-kPa) gage. Any observable pressure increase on the gage is an indication that the apparatus does not adequately meet the specifications of the method. If this problem is encountered, the manufacturer should be consulted for remedy.

A1.1.5 Volumetric Capacity of Air and Gasoline Chambers—In order to ascertain if the volume ratio of the chambers is between the specified limits of 3.8 to 4.2, measure a quantity of water greater than will be needed to fill the gasoline and air chambers. The gasoline chamber shall be completely filled with water, and the difference between the original volume and the remaining volume is the volume of the gasoline chamber. Then, after connecting the gasoline and air chambers, the air chamber shall be filled to the seat of the gage connection with more of the measured water, and the difference in volumes shall be the volume of the air chamber.

A1.1.6 Checking for Freedom of Leaks—Before placing new apparatus in service and as often as necessary thereafter, the assembled vapor pressure apparatus shall be checked for freedom of leaks by filling with air to 100-psi (700-kPa) gage pressure and completely immersing in a water bath. Only apparatus which stand this test without leaking shall be used.

A1.2 Pressure Gage—The pressure gage shall be a Bourdon-type spring gage of test gage quality 4½ to 5½ inches (100 to 150 mm) in diameter provided with a nominal ¼ inch male thread connection with a passageway not less than 3/16 inch in diameter from the Bourdon tube to the atmosphere. The range and graduations of the pressure gage shall be governed by the vapor pressure of the sample being tested, in accordance with Table A1.1. Only accurate gages shall be continued in use. The calibration correction shall not be greater than 0.15 psi (0.3 kPa) for a 0 to 15-psi (0 to 30-kPa) gage or 0.3 psi (0.9 kPa) for a 0 to 30-psi (0 to 90-kPa) gage.

A1.3 Water Cooling Bath—A water cooling bath shall be provided of such dimensions that the sample containers and gasoline chambers may be completely immersed. Means for maintaining the bath at a temperature of 32 to 40 °F (0 to 4.5 °C) shall be provided.

Note A1.4: Solid carbon dioxide shall not be used to cool samples in storage or in the preparation of the air saturation step. Carbon dioxide is appreciably soluble in gasoline, and its use has been found to be the cause of erroneous vapor pressure data.

A1.4 Water Bath—The water bath shall be of such dimensions that the vapor pressure apparatus may be immersed to at least 1 inch (25 mm.) above the top of the air chamber. Means for maintaining the bath at a constant temperature of 100 ±0.2 °F (37.8 ±0.1 °C) shall be provided. In order to check this temperature, the bath thermometer shall be immersed to the 98 °F (37 °C) mark throughout the vapor pressure determination.

A1.5 Thermometers:

A1.5.1 For 100 °F (37.8 °C) Air Chamber Procedure—An ASTM Reid Vapor Pressure Thermometer 18F (18C) having a range from 94 to 108 °F (34 to 42 °C).

A1.5.2 For Water Bath—Use the ASTM Thermometer 18F (18C) described in A1.5.1.

A1.6 Mercury Manometer—A mercury manometer, having a range suitable for checking the pressure gage employed, shall be used. The manometer scale may be graduated in steps of 1 mm., 0.1 inch, 0.1 psi, or 0.001 bar.

TABLE A1.1.—PRESSURE GAGE RANGE AND GRADUATION

Gage to be used							
Reid vapor pressure		Scale range		Maximum numbered intervals		Maximum intermediate graduations	
psi	kPa	psi	kPa	psi	kPa	psi	kPa
4 and under	27.5 and under	0 to 5	0 to 35	1	5.0	0.1	0.5
3 to 12	20.0 to 75.0	0 to 15	0 to 100	3	15.0	0.1	0.5
10 to 26	70.0 to 180.0	0 to 30	0 to 200	5	25.0	0.2	1.0
10 to 36	70.0 to 250.0	0 to 45	0 to 300	5	25.0	0.2	1.0

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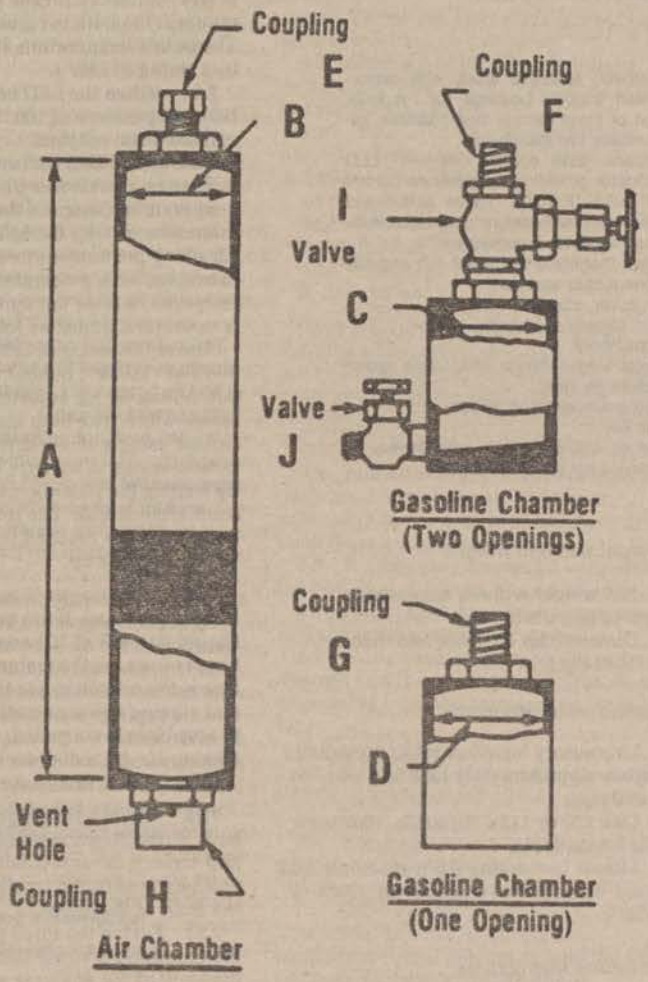

DIMENSIONS OF VAPOR PRESSURE BOMB

Key	Description	In.
A	Air chamber, length	10 ± 1/8
B, C, D	Air and gasoline chambers, ID	2 ± 1/8
E	Coupling, ID min	3/16
F, G	Coupling, OD	1/2
H	Coupling, ID	1/2
I	Valve	1/2
J	Valve	1/4

Figure A1.1 Vapor Pressure Bomb

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Annex A2. Gasoline, Gasoline-Oxygenate Blends, Naphtha, Methyl Cyclopentane, Cyclopentane, N-Pentane, Methyl Tert-Butyl Ether, Tert-Amyl Methyl Ether

A2.1 Danger—Extremely flammable. Vapors harmful if inhaled. Vapors may cause flash fire.
A2.2 Keep away from heat, sparks, and open flame.
A2.3 Keep container closed.
A2.4 Use with adequate ventilation.
A2.5 Avoid build-up of vapors and eliminate all sources of ignition, especially nonexplosion-proof electrical apparatus and heaters.
A2.6 Avoid prolonged breathing of vapor or spray mist.
A2.7 Avoid prolonged or repeated skin contact.

Annex A3. Acetone

A3.1 Danger—Extremely flammable. Vapors may cause flash fire.
A3.2 Keep away from heat, sparks, and open flame.
A3.3 Keep container closed.
A3.4 Use with adequate ventilation.
A3.5 Avoid build-up of vapors, and eliminate all sources of ignition, especially nonexplosion-proof electrical apparatus and heaters.
A3.6 Avoid prolonged breathing of vapor or spray mist.
A3.7 Avoid contact with eyes or skin.

Method 2—Herzog Semi-Automatic Method

1. Scope.

1.1 This test method covers the determination of the absolute vapor pressure of gasolines and gasoline-oxygenate blends using the Herzog Semi-Automatic Apparatus.[1] Test procedures will follow Method 1 except for the additions and changes as noted.

2. Summary of method.

2.1 The chilled liquid chamber is filled with a chilled sample and connected to the heated air chamber by means of a screwed connection. The assembled test chambers are immersed in a constant temperature bath controlled to 100 °F±0.2 °F (37.8 °C±0.1 °C) and rotated systematically until a constant pressure is observed on the pressure gauge (approximately 10 minutes). The pressure observed, suitably corrected, is reported as the Reid vapor pressure.

3. Significance and use.

3.1 This method is to be used as an alternative to Method 1. The procedures are essentially the same except that they are modified to represent the use of the Herzog Semi-Automatic Apparatus. As is the case with Method 1, this is considered to be a "dry" method since it can be used to evaluate both gasoline and gasoline-oxygenate blends.

4. Apparatus.

4.1 The Herzog Semi-Automatic Apparatus is composed of air and liquid test chambers, a constant temperature bath and means for observing the absolute pressure developed in the test chamber during the test. The analyzer is designed to allow the testing of three samples simultaneously.

4.2 The Herzog Semi-Automatic Apparatus consists of the equipment and accessories listed below:

1 Waterbath, stainless steel, with motor-driven support bearings for the rotation of three sample test chamber assemblies simultaneously.
1 Electronic bath control unit with LED indicator providing temperature control of ±0.1 °F (0.05 °C) or better and maximum temperature cutoff and minimum liquid level protection.
1 Control thermometer (35–40 °C) and silicone rubber stopper.
1 Bath cover, stainless steel.
3 Liquid sample chambers.
3 Air chambers.
3 Special screw fittings with teflon spiral.
3 Pressure gauges.
1 Liquid chamber filling device.
1 Table key.
1 115V to 220W step-up transformer (if ordered for 115V operation).

5. Physical size and weight.

5.1 Net weight without accessories (empty): 16 pounds (35 kg).
5.2 Dimensions: 39×20×16.5 inches (86×51×42 cm.).

6. Installation requirements.

6.1 Laboratory bench or table providing a work space approximately four feet wide by two feet deep.
6.2 One 220 or 115V 50/60 Hz, 1000 watt grounded receptacle.
6.3 Means for cooling the test sample and the liquid sample test chamber to 32–34 °F (0–1 °C).

7. Installation instructions.

The recommended installation procedure is outlined below:
7.1 Verify that the working voltage corresponds to the requirements of the analyzer.
7.2 Place and level the analyzer on a stable table or laboratory work bench near the required power supply.
7.3 Release all of the function keys on the control unit.
7.4 Fill the heating bath with *distilled* water to the upper line on the guide tube for the bath control thermometer at the rear right of the bath. (Water containing dissolved salts may shorten the life of the analyzer.)
7.5 Insert the bath control thermometer through the bored silicone rubber stopper (supplied) and place in the thermometer guide tube. (Be sure to coat the glass thermometer with a lubricant and wear punctureproof gloves and safety glasses to avoid breakage and possible injury.)
7.6 Connect the analyzer to the power supply.
7.7 Press the "MAINS" key.
7.8 Press the "STIRRER" key; bath circulation will start.
7.9 Press the "HEATING" key; bath heater will start.

Note 1: It may be necessary to press the "START TROUBLE" switch to begin operation.

7.10 After the preset temperature is reached, the bath is regulated electronically. The bath's temperature stability is indicated by a string of LED's.
7.11 When the LED marked "0" lights, the bath temperature of 100 °F (37.8 °C) (factory set) has been reached.

Note 2: The LED indicator is an optical aid, indicating a deviation from a preset temperature. Compare the bath control thermometer with the LED indicator. Checking the temperature with a calibrated thermometer is recommended. If the bath temperature does not agree with the desired temperature, adjust as follows:

Above the string of LED's is an opening marked "TEMP", behind which is a potentiometer for adjusting the bath temperature. The bath temperature can be *raised*, using a screw driver, by turning the potentiometer *clockwise* and can be *lowered* by turning the potentiometer *counterclockwise*. The readjusted temperature is reached when the LED at the "0" mark lights up.

Note 3: Maximum bath temperature and level is provided. If the bath temperature should rise 4 °F (2 °C) above the set test temperature, or the water level should drop below the minimum acceptable level, heating and stirring will automatically shut off. After the problem is corrected, the heating and stirring can be reactivated by pressing the "START TROUBLE" key.

7.12 Remove the shipping screw from the back of the Bourdon precision pressure gauge and replace the screw with the screw that will be found in the small envelope taped to the front of the gauge.
7.13 Fasten the three pressure gauges to the appropriate vapor line connections along the back of the analyzer with the union nut. *Make certain that the teflon seals are in place and the connection is vapor tight.*

8. Test procedure.

Observe all sections of Method 1 from section 5, *"Reagents,"* through section 11, *"Precision and accuracy,"* except for the following changes:
7.4 Preparation of Air Chamber—Observe the apparatus preparation procedure of section 8.5. Stopper the lower connection of the Herzog air chamber with a #3 rubber stopper and the vent hole with either a #000 cork or a small rubber stopper. Connect the spiral tubing T handle coupling to the air chamber and the quick action coupling to the gage or transducer connection. Immerse the air chamber in the water bath maintained at 100 °F±0.2 °F (37.8 °C±0.1 °C) for not less than 10 minutes just prior to coupling it with the gasoline chamber. Do not remove the air chamber for the bath until the gasoline chamber has been filled with sample as described in 8.1.
8.3 Introduction of the apparatus into bath. Tilt the assembled apparatus to 20 ° to 30 ° downward for four or five seconds to allow the sample to flow into the vapor

[1] Manufactured by Walter Herzog, GMBH, D-6970, Lauda, West Germany.

chamber without getting into the tube extending into the vapor chamber. Place the assembled apparatus in the water bath (maintained at 100 °F±0.2 °F (37.8C±0.1 °C)) in such a way that the base of the gasoline chamber engages the drive coupling and the other end of the assembly rests on its support bearing. Observe the apparatus for leakage thoughout the test. Discard the test at any time a leak is detected.

8.4 Measurement of vapor pressure. After the assembled vapor pressure apparatus has been immersed in the bath for at least 5 minutes, tap the pressure gage lightly and observe the reading. Repeat the tapping at intervals of not less than 2 minutes until two consecutive readings agree. (Tapping is not necessary with the transducer model but reading intervals should be the same.) Record this value as the "uncorrected vapor pressure". Refer to the gage on transducer calibration for the respective unit and add or subtract from the observed uncorrected value any offset indicated by the calibration in that range. Record this value as the Reid vapor pressure of the sample.

8.5 Preparation of apparatus for next test. Disconnect the quick action and T handle couplings. Separate the air and gasoline chambers and discard the contained sample. Thoroughly purge the air chamber of residual sample by filling it with warm water above 90 °F (32 °C) and allowing it to drain (Note 5). Repeat this purging at least five times. Rinse both chambers and sample transfer connection several times with hot water, then several times with acetone, then dry by blowing dried air or pulling a vaccum. Assure that no liquid is present in the T handle fitting or spiral tubing by pulling a vacuum through the tubing. Stopper the gasoline chamber and place it in the refrigerator or icewater bath for the next test.

Appendix F—Test for Determining the Quantity of Alcohol in Gasoline

Method 1—Water Extraction Method

1. *Scope.*

This test method covers the determination of the type and amount of alcohols in gasoline.

2. *Summary of method.*

Gasoline samples are extracted with water prior to analysis on a gas chromatograph (GC). The extraction eliminates hydrocarbon interference during chromatography. A known quantity of isopropanol is added to the fuel prior to extraction to act as an internal standard.

3. *Sample description.*

3.1 Sample in accordance with 40 CFR Part 80, Appendix D.

3.2 At least 100 ml. of gasoline suspected of containing ethanol and/or methanol are required.

4. *Apparatus.*

4.1 Gas chromatograph—A gas chromatograph equipped with a flame ionization detector.

4.2 Column—A gas chromatograph column, glass, 1800 by 6.35 cm. outside diameter, packed with chromosorb 102.

4.3 Recorder—A 1-mv recorder with a 1 second full scale response and a chart speed of 10 mm. per minute (0.4 inches per minute).

4.4 Syringe (100 ul.) for adding the internal standard.

4.5 Pipet.

4.6 Injection syringe (10 ul.).

4.7 Extraction syringe (1–5 ml.) with 3-inch needle.

4.8 250 ml. (½ pint) glass sample bottles with screw caps or equivalent.

4.9 Calibration standard solutions extracted from gasoline containing known quantities of alcohols.

4.10 Reference standard solutions extracted from gasoline containing known quantities of alcohols.

4.11 Distilled water.

4.12 Reagent grade isopropanol.

4.13 Rubber gloves.

4.14 I.D. tags.

5. *Precautions.*

Note 1: Gasoline and alcohols are extremely flammable and may be toxic over prolonged exposure. Methanol is particularly hazardous. Persons performing this procedure must be familiar with the chemicals involved and all precautions applicable to each.

5.1 Extractions and dilutions must be performed in well-ventilated areas, preferably under a fume hood, away from open flames and sparks.

5.2 Rubber gloves must be worn during the handling of gasoline and alcohols.

5.3 Avoid breathing fumes from gasoline and alcohols, particularly methanol.

5.4 Gas cylinders must be properly secured and the hydrogen FID fuel must be segregated from the compressed air (oxidizer) tank.

6. *Visual inspection.*

6.1 Ensure that the samples do not certain sediment or separated phases prior to extraction.

6.2 Ensure adequate quantities of GC supply gases to maintain a run.

7. *Test article preparation.*

7.1 Gas chromatography—Use carrier gas, flow rates, detector and injection temperatures and column as specified in the GC manufacturer's specifications.

7.2 Sample extraction, preparation and analysis.

7.2.1 Label two 6 ml. vials with the sample identification number supplied with the original sample. The estimated percent alcohol from any screening tests must also be included on the label.

7.2.2 Pipet 4 ml.±0.01 ml. of sample into one of the vials. Label as vial #1.

7.2.3 Measure 100 ul. (0.1 ml.)±0.5 ul. of isopropanol into vial #1.

Note: This adds an internal standard to the sample which is required for accurate analysis.

7.2.4 Add 1 ml.±0.2 ml. of distilled water to the gasoline sample in vial #1 and shake for 10 seconds.

7.2.5 Allow the mixture to separate into two phases (at least 5 minutes).

7.2.6 Carefully draw off the aqueous (lower) phase using a 5 ml. syringe and long needle.

Note: Be careful not to allow any of the gasoline phase to get into the needle. Leave a small amount (approximately 0.2 ml.) of the aqueous phase in the vial.

7.2.7 Transfer the aqueous phase into the other 6 ml. vial (vial #2).

7.2.8 Repeat steps 7.2.4 to 7.2.6 two more times.

7.2.9 Fill vial #2 (the aqueous phase) to 4 ml.±0.05 ml. with distilled water.

7.2.10 Retain the remaining original gasoline sample (not the gasoline phase).

7.2.11 Discard the extracted gasoline phase in vial #1 in an appropriate manner.

7.2.12 Perform a second extraction on one sample in every 20. This sample is to be labeled with the sample number and as a duplicate and run as a normal sample.

7.2.13 Transfer approximately 2 ml. of the aqueous solution to vials compatible with the autosampler. Tag the vial with the sample number.

7.2.14 Perform analysis of the sample according to the GC manufacturer's specifications.

7.3 Standards.

7.3.1 Calibration standard solutions (made in gasoline).

7.3.1.1 Reagent grade or better alcohols (including undenatured ethanol) are to be diluted with regular unleaded gasoline. The isopropanol internal standard is to be added during extraction of the alcohols. Newly acquired stocks of reagent grade alcohols shall be diluted to 10% with hydrocarbon-free water and analyzed for contamination by GC before use.

7.3.1.2 Required calibration standards (% by volume in gasoline):

Alcohol	Range (percent)	Standard (MIN)
Methanol	0.5–12	5
Ethanol	0.5–11	5

The standards should be as equally spaced within the range as possible and may contain more than one alcohol.

Note: Level #1 must contain all of the alcohols.

8. *Quality control provisions.*

8.1 Alcohol(s) in water solution may be used to characterize the GC. The resulting characterization always reflects the absolute sensitivity of the instrument to each alcohol.

8.2 Calibration standards are made by extraction of known alcohol(s) in gasoline blends. These standards account for inaccuracies caused by incomplete extraction of alcohols.

8.3 The addition of isopropanol as an internal standard reduces errors caused by variations in injection volumes, and further reduces inaccuracies caused by incomplete extraction of alcohols.

8.4 Sufficient sample should be retained to permit reanalysis.

8.5 Running averages of reference standards data must not exceed 0.75% of applicable limits or investigation should be started for the cause of such variation.

9. *Calculations.*

9.1 Calculate purity of component as follows:

$$P_i = \frac{A_i}{\Sigma_A}$$ expressed as a decimal fraction, that is 0.999

where:

P_i = purity of component i,
A_i = area of response of component i, and
Σ_A = total area response of all components.

9.2 Calculate response factors as follows:

$$F_i = \frac{A_{is} \times W_i \times P_i}{A_i \times W_{is} \times P_{is}}$$

where:

F_i = response factor for component of interest i,
A_i = area response for component of interest i,
A_{is} = area response of internal standard,
W_i = weight of component of interest i (be sure to consider all sources),
W_{is} = weight of internal standard,
P_i = purity of component of interest i as determined in 9.1 expressed as a decimal, and
P_{is} = purity of internal standards as determined in 9.1 expressed as a decimal.

9.3 Calculate the percent alcohols as follows:

$$C_i = \frac{W_{is} \times A_i \times F_i}{W_i \times A_{is}} \times 100 = \text{weight \% component i}$$

where:

A_i = peak area component i,
A_{is} = peak area of internal standard,
W_i = weight of sample,
W_{is} = weight of internal standard, and
F_i = response factor for component i.

10. *Report.*

10.1 Report results to the nearest 0.1%.

11. *Precision and accuracy.*

11.1 Precision—The precision of this test method has not been determined.

11.2 Accuracy—The accuracy of this test method has not been determined.

Method 2—Test Method for Determination of C_1 to C_4 Alcohols and MTBE in Gasoline by Gas Chromatography

1. *Scope.*

1.1 This test method covers a procedure for determination of methanol, ethanol, isopropanol, n-propanol, isobutanol, sec-butanol, tert-butanol, n-butanol, and methyl tertiary butyl ether (MTBE) in gasoline by gas chromatography.

1.2 Individual alcohols and MTBE are determined from 0.1 to 10 volume %. Any sample found to contain greater than 10 volume % of an alcohol or MTBE shall be diluted to concentrations within these limits.

1.3 SI (metric) units of measurement are preferred and used throughout this standard. Alternative units, in common usage, are also provided to improve the clarity and aid the user of this test method.

1.4 This standard may involve hazardous materials, operations, and equipment. This standard does not purport to address all of the safety problems associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

2. *Referenced documents.*

2.1 ASTM Standards:

D 4307 Practice for Preparation of Liquid Blends for Use as Analytical Standards[1]
D 4626 Practice for Calculation of Gas ChromatographicResponse Factors[1]
E 260 Practice for Packed Column Gas Chromatographic Procedures[2]
E 355 Practice for Gas Chromatography Terms and Relationships[2]

2.2 EPA Regulations:

40 CFR Part 80 Appendix D

3. *Descriptions of terms specific to this standard.*

3.1 MTBE—methyl tertiary butyl ether.

3.2 Low volume connector—a special union for connecting two lengths of tubing 1.6 mm inside diameter and smaller. Sometimes this is referred to as a zero dead volume union.

3.3 Oxygenates—used to designate fuel blending components containing oxygen, either in the form of alcohol or ether.

3.4 Split ratio—a term used in gas chromatography using capillary columns. The split ratio is the ratio of the total flow of the carrier gas to the sample inlet versus the flow of carrier gas to the capillary column. Typical values range from 10:1 to 500:1 depending upon the amount of sample injected and the type of capillary column used.

3.5 WCOT—abbreviation for a type of capillary column used in gas chromatography that is wall-coated open tubular. This type of column is prepared by coating the inside of the capillary with a thin film of stationary phase.

3.6 TCEP—1,2,3,-tris-2-cyanoethoxypropane—a gas chromatographic liquid phase.

4. *Summary of test method.*

4.1 An internal standard, tertiary amyl alcohol, is added to the sample which is then introduced into a gas chromatograph equipped with two columns and a column switching valve. The sample first passes onto a polar TCEP column which elutes lighter hydrocarbons to vent and retains the oxygenated and heavier hydrocarbons. After methylcyclopentane, but before MTBE elutes from the polar column, the valve is switched to backflush the oxygenates onto a WCOT non-polar column. The alcohols and MTBE elute from the non-polar column in boiling point order, before elution of any major hydrocarbon constituents. After benzene elutes from the non-polar column, the column switching valve is switched back to its original position to backflush the heavy hydrocarbons. The eluted components are detected by a flame ionization or thermal conductivity detector. The detector response, proportional to the component concentration, is recorded; the peak areas are measured; and the concentration of each component is calculated with reference to the internal standard.

5. *Significance and use.*

5.1 Alcohols and other oxygenates may be added to gasoline to increase the octane number. Type and concentration of various oxygenates are specified and regulated to ensure acceptable commercial gasoline quality. Drivability, vapor pressure, phase separation, and evaporative emissions are some of the concerns associated with oxygenated fuels.

5.2 This test method is applicable to both quality control in the production of gasoline and for the determination of deliberate or extraneous oxygenate additions or contamination.

6. *Apparatus.*

6.1 Chromatograph:

6.1.1 A gas chromatographic instrument which can be operated at the conditions given in Table 1, and having a column switching and backflushing system equivalent to Fig. 1. Carrier gas flow controllers shall be capable of precise control where the required flow rates are low (Table 1). Pressure control devices and gages shall be capable of precise control for the typical pressures required.

[1] Annual Book of ASTM Standards, Vol. 05.03.
[2] Annual Book of ASTM Standards, Vol. 14.01.

TABLE 1.—CHROMATOGRAPHIC OPERATING CONDITIONS

Temperatures		Flows, mL/min		Other parameters: Carrier gas, helium	
Column oven, °C	60	To injector	75	Sample size, μL	3
Injector, °C	200	Column	5	Split ratio	15 : 1
Detector—TCD, °C	200	Auxiliary	3	Backflush, min	0.2–0.3
FID, °C	250	Makeup	18	Valve reset time, min	8–10
Valve, °C	60			Total analysis time, min	18–20

6.1.2 Detector—A thermal conductivity detector or flame ionization detector may be used. The system shall have sufficient sensitivity and stability to obtain a recorded deflection of at least 2 mm at a signal-to-noise ratio of at least 5 to 1 for 0.005 volume % concentration of an oxygenate.

6.1.3 Switching and backflushing valve—A valve, to be located within the gas chromatographic column oven, capable of performing the functions described in Section 11, and illustrated in Fig. 1. The valve shall be of low volume design and not contribute significantly to chromatographic deterioration.

6.1.3.1 Valco Model No. CM–VSV–10–HT, 1.6-mm (1/16-in.) fittings. This particular valve was used in the majority of the analyses used for the development of Section 15.

6.1.3.2 Valco Model No. C10W, 0.8-mm (1/32-in.) fittings. This valve is recommended for use with columns of 0.32-mm inside diameter and smaller.

6.1.4 Although not mandatory, an automatic valve switching device is strongly recommended to ensure repeatable switching times. Such a device should be synchronized with injection and data collection times. If no such device is available, a stopwatch, started at the time of injection, should be used to indicate the proper valve switching time.

6.1.5 Injection system—The chromatograph should be equipped with a splitting-type inlet device. Split injection is necessary to maintain the actual chromatographed sample size within the limits of column and detector optimum efficiency and linearity.

6.1.6 Sample introduction—Any system capable of introducing a representative sample into the split inlet device. Microlitre syringes, automatic syringe injectors, and liquid sampling valves have been used successfully.

6.2 Data presentation or calculation, or both:

6.2.1 Recorder—A recording potentiometer or equivalent with a full-scale deflection of 5 mV or less. Full-scale response time should be 1 s or less with sufficient sensitivity and stability to meet the requirements of 6.1.2.

6.2.2 Integrator or computer—Devices capable of meeting the requirements of 6.1.2, and providing graphic and digital presentation of the chromatographic data, are recommended for use. Means shall be provided for determining the detector response. Peak heights or areas can be measured by computer, electronic integration or manual techniques.

6.3 Columns, two as follows:

6.3.1 Polar column—This column performs a preseparation of the oxygenates from volatile hydrocarbons in the same boiling point range. The oxygenates and remaining hydrocarbons are backflushed onto the non-polar column in section 6.3.2. Any column with equivalent or better chromatographic efficiency and selectivity to that described in 6.3.1.1 can be used. The column shall perform at the same temperature as required for the column in 6.3.2.

6.3.1.1 TCEP micro-packed column, 560 mm (22 in.) by 1.6-mm (1/16-in.) outside diameter by 0.38-mm (0.015-in.) inside diameter stainless steel tube packed with 0.14 to 0.15g of 20% (mass/mass) TCEP on 80/100 mesh Chromosorb P(AW). This column was used in the (ASTM) cooperative study to provide the Precision and Bias data referred to in Section 15.

6.3.2 Non-polar (analytical) column—Any column with equivalent or better chromatographic efficiency and selectivity to that described in 6.3.2.1 and illustrated in Fig. 2 can be used.

6.3.2.1 WCOT methyl silicone column, 30m (1181 in.) long by 0.53 mm (0.021-in.) inside diameter fused silica WCOT column with a 2.6-μm film thickness of cross-linked methyl siloxane. This column was used in the (ASTM) cooperative study to provide the Precision and Bias data referred to in Section 15.

7. *Reagents and materials.*

7.1 Carrier gas—Carrier gas appropriate to the type of detector used. Helium has been used successfully. The minimum purity of the carrier gas used must be 99.95 mol %.

7.2 Standards for calibration and identification—Standards of all components to be analyzed and the internal standard are required for establishing identification by retention as well as calibration for quantitative measurements. These materials shall be of known purity and free of the other components to be analyzed.

Note 1.—Warning—These materials are flammable and may be harmful or fatal if ingested or inhaled.

7.3 Preparation of calibration blends—For best results, these components must be added to a stock gasoline or petroleum naphtha, free of oxygenates (Warning—See Note 2). Refer to Test Method D 4307 for preparation of liquid blends. The preparation of several different blends, at different concentration levels covering the scope of the method, is recommended. These will be used to establish the linearity of the component response.

Note 2.—Warning—Extremely flammable. Vapors harmful if inhaled.

7.4 Methylene chloride—Used for column preparation. Reagent grade, free of non-volatile residue.

Note 3.—Warning—Harmful if inhaled. High concentrations may cause unconsciousness or death.

8. *Preparation of column packings.*

8.1 TCEP column packing:

8.1.1 Any satisfactory method, used in the practice of the art that will produce a column capable of retaining the C_1 to C_4 alcohols and MTBE from components of the same boiling point range in a gasoline sample. The following procedure has been used successfully.

8.1.2 Completely dissolve 10 g of TCEP in 100 mL of methylene chloride. Next add 40 g of 80/100 mesh Chromosorb P(AW) to the TCEP solution. Quickly transfer this mixture to a drying dish, in a fume hood, without scraping any of the residual packing from the sides of the container. Constantly, but gently, stir the packing until all of the solvent has evaporated. This column packing can be used immediately to prepare the TCEP column.

9. *Preparation of micro-packed TCEP column.*

9.1 Wash a straight 560 mm length of 1.6-mm outside diameter (0.38-mm inside diameter) stainless steel tubing with methanol and dry with compressed nitrogen.

9.2 Insert 6 to 12 strands of silvered wire, a small mesh screen or stainless steel frit inside one end of the tube. Slowly add 0.14 to 0.15 g of packing material to the column and gently vibrate to settle the packing inside the column. When strands of wire are used to retain the packing material inside the column, leave 6.0 mm (0.25 in.) of space at the top of the column.

9.3 Column conditioning—Both the TCEP and WCOT columns are to be briefly conditioned before use. Connect the columns to the valve (see 11.1) in the chromatographic oven. Adjust the carrier gas flows as in 11.3 and place the valve in the RESET position. After several minutes, increase the column oven temperature to 120 °C and maintain these conditions for 5 to 10 min. Cool the columns below 60 °C before shutting off the carrier flow.

10. *Sampling.*

10.1 Gasoline samples to be analyzed by this test method shall be sampled in accordance with 40 CFR Part 80, Appendix D.

11. *Preparation of apparatus and establishment of conditions.*

11.1 Assembly—Connect the WCOT column to the valve system using low volume connectors and narrow bore tubing. It is important to minimize the volume of the chromatographic system that comes in

contact with the sample, otherwise peak broadening will occur.

11.2 Adjust the operating conditions to those listed in Table 1, but do not turn on the detector circuits. Check the system for leaks before proceeding further.

11.3 Flow rate adjustment.

11.3.1 Attach a flow measuring device to the column vent with the valve in the RESET position and adjust the pressure to the injection port to give 5.0 mL/min flow (14 psig). Soap bubble flow meters are suitable.

11.3.2 Attach a flow measuring device to the split injector vent and adjust flow from the split vent using the A flow controller to give a flow of 70 mL/min. Recheck the column vent flow set in 11.3.1 and adjust if necessary.

11.3.3 Switch the valve to the BACKFLUSH position and adjust the variable restrictor to give the same column vent flow set in 11.3.1. This is necessary to minimize flow changes when the valve is switched.

11.3.4 Switch the valve to the inject position RESET and adjust the B flow controller to give a flow of 3.0 to 3.2 mL/min at the detector exit. When required for the particular instrumentation used, add makeup flow or TCD switching flow to give a total of 21 mL/min at the detector exit.

11.4 When a thermal conductivity detector is used, turn on the filament current and allow the detector to equilibrate. When a flame ionization detector is used, set the hydrogen and air flows and ignite the flame.

11.5 Determine the Time of Backflush—The time to backflush will vary slightly for each column system and must be determined experimentally as follows. The start time of the integrator and valve timer must be synchronized with the injection to accurately reproduce the backflush time.

11.5.1 Initially assume a valve BACKFLUSH time of 0.23 min. With the valve RESET, inject 3 μL of a blend containing at least 0.5% or greater oxygenates (7.3), and simultaneously begin timing the analysis. At 0.23 min., rotate the valve to the BACKFLUSH position and leave it there until the complete elution of benzene is realized. Note this time as the RESET time, which is the time at which the valve is returned to the RESET position. When all of the remaining hydrocarbons are backflushed the signal will return to a stable baseline and the system is ready for another analysis. The chromatogram should appear similar to that illustrated in Fig. 2.

11.5.2 It is necessary to optimize the valve BACKFLUSH time by analyzing a standard blend containing oxygenates. The correct BACKFLUSH time is determined experimentally by using valve switching times between 0.2 and 0.3 min. When the valve is switched too soon, C_5 and lighter hydrocarbons are backflushed and are co-eluted in the C_4 alcohol section of the chromatogram. When the valve BACKFLUSH is switched too late, part or all of the MTBE component is vented resulting in an incorrect MTBE measurement. Chromatograms resulting from incorrect valve times are shown in Figs. 3 and 4.

12. Calibration and standardization.

12.1 Identification—Determine the retention time of each component by injecting small amounts either separately or in known mixtures or by comparing the relative retention times with those in Table 2.

12.2 Standardization—The area under each peak in the chromatogram is considered a quantitative measure of the corresponding compound. Measure the peak area of each oxygenate and of the internal standard by either manual methods or electronic integrator. Calculate the relative volume response factor of each oxygenate, relative to the internal standard, according to Test Method D 4626.

TABLE 2.—RETENTION CHARACTERISTICS FOR TCEP/WCOT COLUMN SET CONDITIONS AS IN TABLE 1

Component	Retention time, min	Relative retention time (t-amyl alcohol = 1.00)
Methanol	3.21	0.44
Ethanol	3.58	0.50
Isopropanol	3.95	0.56
tert-Butanol	4.31	0.61
n-Propanol	4.75	0.68
MTBE	5.29	0.76
sec-Butanol	5.63	0.82
Isobutanol	6.33	0.93
n-Butanol	7.55	1.10
Benzene	7.88	1.17

13. Procedure.

13.1 Preparation of sample—Precisely add a quantity of the internal standard to an accurately measured quantity of sample. Concentrations of 1 to 5 volume percent have been used successfully.

13.2 Chromatographic analysis—Introduce a representative aliquot of the sample, containing internal standard, into the chromatograph using the same technique as used for the calibration analyses. An injection volume of 3 μL with a 15:1 split ratio has been used successfully.

13.3 Interpretation of chromatogram—Compare the results of sample analyses to those of calibration analyses to determine identification of oxygenates present.

14. Calculation.

14.1 After identifying the various oxygenates, measure the area of each oxygenate peak and that of the internal standard. Calculate the volume percent of each oxygenate as follows:

$$V_j = \frac{V_s \times PA_j \times 100}{PA_s \times S_j \times V_G}$$

where:

V_j = volume percent of oxygenate to be determined,

V_s = volume of internal standard (tert-amyl alcohol) added,

V_G = volume of gasoline sample taken,

PA_j = peak area of the oxygenate to be determined,

PA_s = peak area of the internal standard (tert-amyl alcohol), and

S_j = relative volume response factor of each component (relative to the internal standard).

14.2 Report the volume of each oxygenate. If the volume percent exceeds 10%, dilute the sample to a concentration lower than 10% and repeat the procedures in sections 13 and 14.

15. Precision and bias.

15.1 Precision—The precision of this test method as determined by statistical examination of the interlaboratory test results is as follows:

15.1.1 Repeatability—The difference between successive results obtained by the same operator with the same apparatus under constant operating conditions on identical test materials would, in the long run, in the normal and correct operation of the test method exceed the following values only in one case in twenty (see Table 3).

Methanol $0.086 \times (V+0.070)$.
Ethanol $0.083 \times (V+0.000)$.
Isopropanol $0.052 \times (V+0.150)$.
n-Propanol $0.040 \times (V+0.026)$.
Isobutanol $0.064 \times (V+0.086)$
sec-Butanol $0.014 \times \sqrt{V}$
tert-Butanol $0.052 \times (V+0.388)$
n-Butanol $0.043 \times (V+0.020)$

MTBE $0.104 \times (V+0.028)$

where V is the mean volume percent.

15.1.2 Reproducibility—The difference between two single and independent results obtained by different operators working in different laboratories on identical material would, in the long run, exceed the following values only in one case in twenty (see Table 3).

Methanol $0.361 \times (V+0.070)$.
Ethanol $0.373 \times (V+0.000)$.
Isopropanol $0.214 \times (V+0.150)$.
n-Propanol $0.163 \times (V+0.026)$.
Isobutanol $0.179 \times (V+0.086)$
sec-Butanol $0.277 \times \sqrt{V}$
tert-Butanol $0.178 \times (V+0.388)$
n-Butanol $0.415 \times (V+0.020)$

MTBE $0.244 \times (V+0.028)$

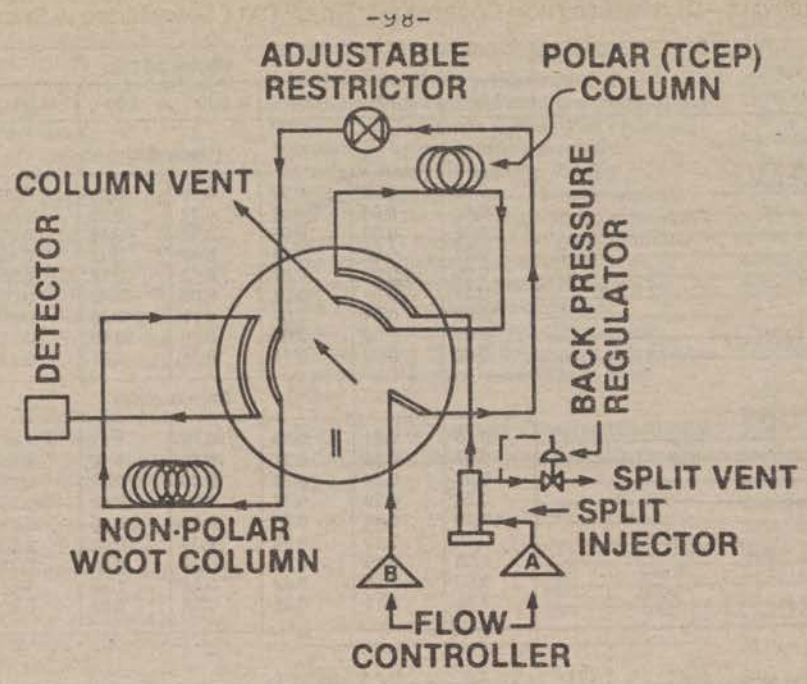
where V is the mean volume percent.

15.2 Bias—Since there is no accepted reference material suitable for determining bias for the procedure in the test method, bias cannot be determined.

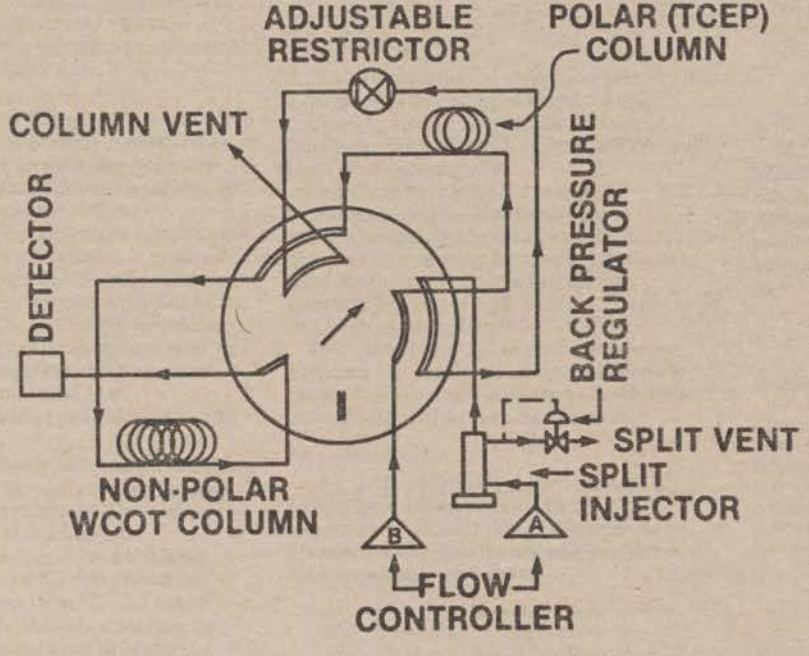
TABLE 3.—PRECISION INTERVALS—DETERMINED FROM COOPERATIVE STUDY DATA SUMMARIZED IN SECTION 15

Components	Volume percent							
	0.20	0.50	1.00	2.00	3.00	4.00	5.00	6.00
Repeatability								
Methanol	0.02	0.05	0.09	0.18	0.26	0.35	0.44	0.52
Ethanol	0.02	0.04	0.08	0.17	0.25	0.33	0.42	0.50
Isopropanol	0.02	0.03	0.06	0.11	0.16	0.22	0.27	0.32
n-Propanol	0.01	0.02	0.04	0.08	0.12	0.16	0.20	0.24
tert-Butanol	0.03	0.05	0.07	0.12	0.18	0.23	0.28	0.33
sec-Butanol	0.01	0.01	0.01	0.02	0.02	0.03	0.03	0.03
Isobutanol	0.02	0.04	0.07	0.13	0.20	0.26	0.33	0.39
n-Butanol	0.01	0.02	0.04	0.09	0.13	0.17	0.22	0.26
MTBE	0.02	0.05	0.11	0.21	0.31	0.42	0.52	0.63
Reproducibility								
Methanol	0.10	0.21	0.39	0.75	1.11	1.47	1.83	2.19
Ethanol	0.07	0.19	0.37	0.75	1.12	1.49	1.87	2.24
Isopropanol	0.07	0.14	0.25	0.46	0.67	0.89	1.10	1.32
n-Propanol	0.04	0.09	0.17	0.33	0.49	0.66	0.82	0.98
tert-Butanol	0.10	0.16	0.25	0.43	0.60	0.78	0.96	1.14
sec-Butanol	0.12	0.20	0.28	0.39	0.48	0.55	0.62	0.68
Isobutanol	0.05	0.10	0.19	0.37	0.55	0.73	0.91	1.09
n-Butanol	0.09	0.22	0.42	0.84	1.25	1.67	2.08	2.50
MTBE	0.05	0.12	0.23	0.45	0.68	0.90	1.13	1.35

BILLING CODE 6560-50-M



Valve in RESET Position



Valve in BACKFLUSH Position

FIG. 1 Analysis of Oxygenates in Gasoline Schematic of Chromatographic System

-99-

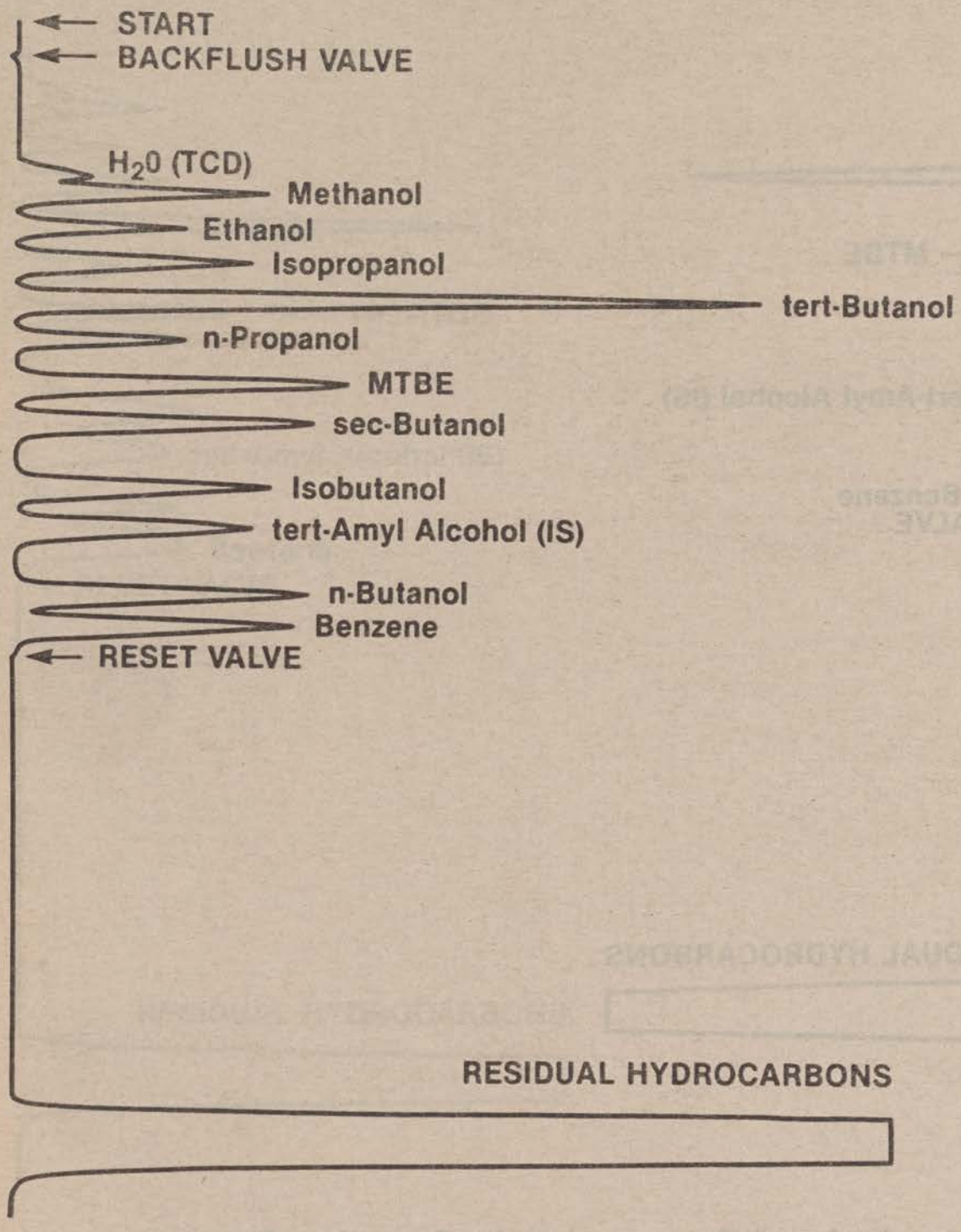


FIG. 2 Analysis of Oxygenates in Gasoline Example of Chromatographic Results

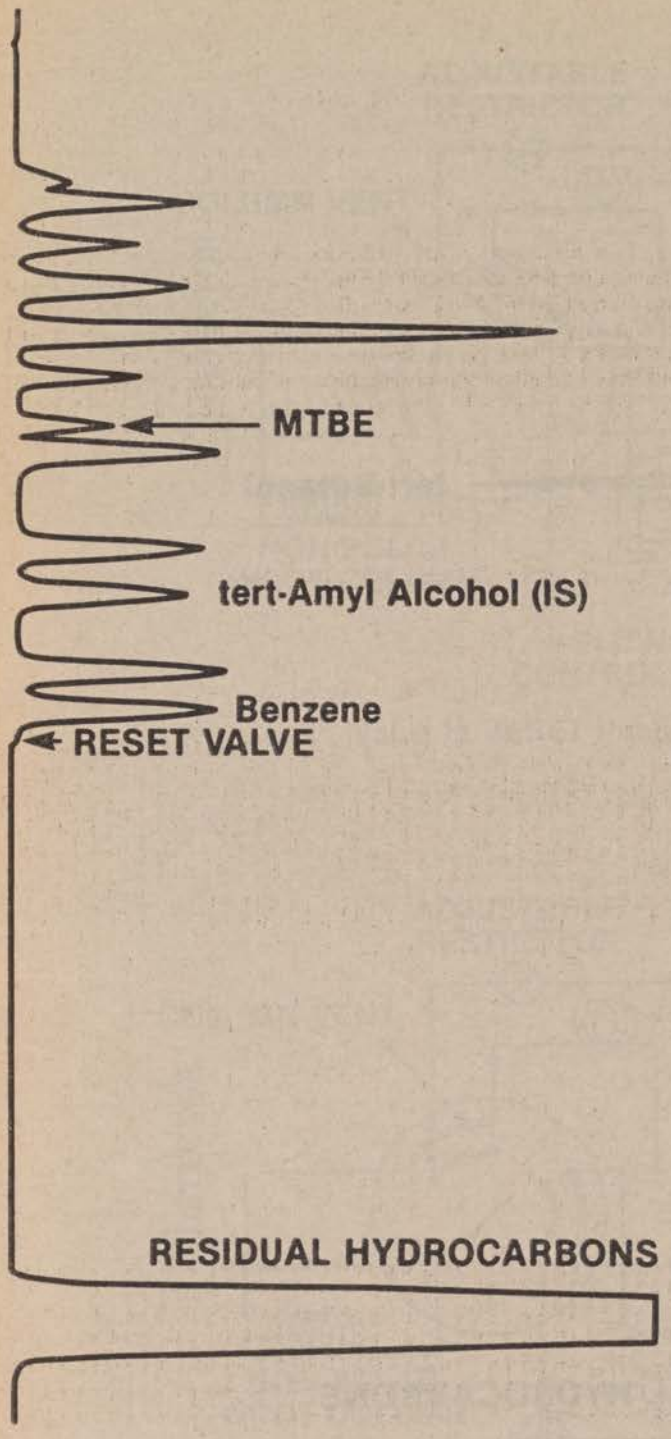


FIG. 3 Analysis of Oxygenates in Gasoline Example Chromatogram Showing Loss of MTBE Due to Venting with Light Hydrocarbons by Late Backflush Time

-101-

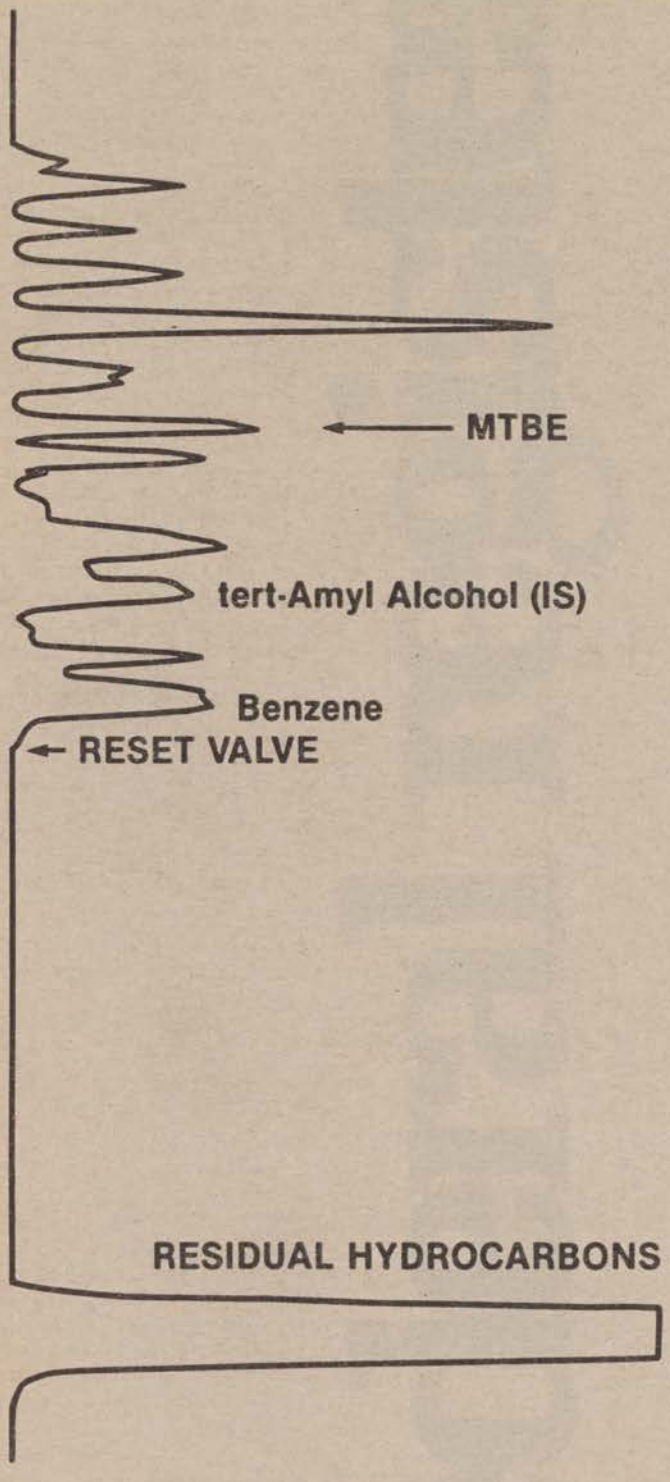


FIG. 4 Analysis of Oxygenates in Gasoline Example Chromatogram Showing Presence of Interferences Caused by Early Backflush Time

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