Findings and Views Concerning the Exemption of Aviation Gasoline from the Mandatory Petroleum Allocation and Price Regulations

MASTER

June 1978 (Statistically Updated to December 1978)

U.S. Department of Energy
Economic Regulatory Administration
Office of Regulations and Emergency Planning

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Findings and Views
Concerning the Exemption of
Aviation Gasoline from the
Mandatory Petroleum
Allocation and Price Regulations

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FOREWORD

This report represents the Economic Regulatory Administration's current Findings and Views regarding the exemption of aviation gasoline from ERA's Allocation and Price Regulations. In June 1978 we issued an earlier version of these Findings and Views for public comment. This updated version now contains statistical information through January 1979. The supply/demand forecast contained in Chapter IV now includes projections for 1980. Having evaluated the comments received and the more recent figures, we have changed neither our conclusions nor the substance of the analysis upon which they are based. Accordingly, the text of this document is similar to that of the June 1978 report.

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EXECUTIVE SUMMARY

- To exempt aviation gasoline from the Mandatory Petroleum Allocation Regulations, the Department of Energy (DOE) must find "...that such oil or refined product category is no longer in short supply and that exempting such oil or refined product category would not have an adverse impact on the supply of any other oil or refined product..." [Section 12(d)(1)(A) of the Emergency Petroleum Allocation Act of 1973 (EPAA), as amended]. Currently aviation gasoline represents approximately 0.3 percent of the total refinery yield from U.S. refineries. DOE concludes that domestic refinery capacity together with available imports are sufficient to meet projected increases in demand for aviation gasoline through the year 1980. Exemption may, in fact, stimulate production and supply.
- To exempt aviation gasoline from the Mandatory Petroleum Price Regulations, the DOE must also find "...that competition and market forces are adequate to protect consumers and that exempting such oil or refined product category will not result in inequitable prices

for any class of users of such oil or product..."

[Section 12(d)(1)(B) of the EPAA]. With current adequate supplies of aviation gasoline, and the industry operating at an adequate level of profitability, DOE finds that aviation gasoline prices are not experiencing significant upward pressures. Competition and market forces are therefore currently adequate to protect consumers, and supplies are estimated to be sufficient in the future to prevent inequitable prices for any class of consumer as a result of exempting aviation gasoline from regulation.

- The DOE further finds that the exemption of aviation gasoline is consistent with the attainment of the objectives set forth in the EPAA.
- The DOE also finds that exemption of aviation gasoline from regulation will not significantly affect the rate of unemployment, Consumer Price Index, or the Gross National Product (GNP).
- Continuation of aviation gasoline regulations designed for an embargo situation has not appeared to be necessary to achieve the objectives of the EPAA. The Economic Regulatory Administration (ERA) submitted a proposed aviation gasoline exemption to the Federal Energy Regulatory Commission (FERC) under sections

402(c)(1) and 404 of the Department of Energy Organization Act, Pub. L. 95-91 ("DOE Act"). After receiving public comment, the FERC concurred with ERA's proposal. The DOE is now transmitting to the Congress, in accordance with the requirements of Section 12 of the EPAA, Section 551 of the Energy Policy and Conservation Act (EPCA), and Section 102 of the Energy Conservation and Production Act (ECPA) the exemption of aviation gasoline from the Mandatory Petroleum Allocation and Price Regulations.

CHAPTER I

INTRODUCTION

This report presents the DOE's findings and views with respect to its proposal to exempt aviation gasoline from the Mandatory Petroleum Allocation and Price Regulations (10 CFR, Parts 210, 211, and 212), issued pursuant to the Emergency Petroleum Allocation Act of 1973 (EPAA), Public Law 93-159 (November 27, 1973), as amended. The Energy Policy and Conservation Act (EPCA), Public Law 94-163 (December 22, 1975), in Section 455, added Section 12 to the EPAA, requiring that any amendment submitted to the Congress for the purpose of exempting a petroleum product or refined product category from regulation be supported with certain findings and views on a variety of matters related to the exemption. Section 102 of the Energy Conservation and Production Act (ECPA), Public Law 94-385 (August 14, 1976), requires separate submissions to the Congress of energy actions exempting a refined product category from both price and allocation provisions of the DOE regulations, but it does permit separate energy actions exempting a product from price and allocation regulations to be submitted concurrently.

Based on an analysis of historic and projected supply, demand, and price trends, the DOE has concluded that allocation and price controls are no longer necessary

for aviation gasoline and that its exemption in addition to satisfying the other requisite criteria of Section 12 of the EPAA, will be consistent with the attainment of the objectives specified in Section 4 (b)(1) of the EPAA. Accordingly, the DOE is submitting concurrently to the Congress in accordance with the provisions of Section 12 of the EPAA, Section 551 of the EPCA, and Section 102 of the ECPA, two energy actions to exempt aviation gasoline from allocation and price controls. The exemption will become effective and the regulations will be converted to standby status following the expiration of the period allowed for legislative review. Inasmuch as DOE is submitting concurrent energy actions exempting aviation gasoline from both price and allocation regulations, this report considers the impact of both exemptions.

The DOE's findings regarding the exemption of aviation gasoline from regulation are as follows:

- o Aviation gasoline is not in short supply.
- o Exemption of aviation gasoline from the allocation and price regulations will not have an adverse impact on the supply of any other oil or refined petroleum product subject to the EPAA.
- o Competition and market forces are adequate to protect consumers following exemption of aviation gasoline from regulation.

- o Exemption of aviation gasoline from regulation will not result in inequitable prices for any class of user of aviation gasoline or other products.
- o Exemption will not have adverse state or regional impacts.
- o Exemption of aviation gasoline will not have an adverse effect on:
 - availability of consumer goods and services;
 - the Gross National Product (GNP);
 - competition;
 - small business;
 - supply and availability of energy resources as fuel or feedstocks for industry;
 - consumer prices, Consumer Price Index (CPI) or the implicit price deflator for the GNP; or,
 - the rate of unemployment.

The DOE also believes that an exemption of aviation gasoline from the price and allocation regulations is consistent with the objectives set forth in Section 4 (b)(1) of the EPAA. Since adequate supply presently exists and is projected, continued mandatory price and allocation controls for aviation gasoline are unnecessary to:

- o protect public health, safety, welfare, and national defense [Section 4(b)(1)(A)];
- o maintain public services [Section 4(b)(1)(B)] and agriculture operations [Section 4(b)(1)(C)];

- o maintain exploration for and production or extraction of fuels and minerals [Section 4(b)(1)(G)]; or
- o insure equitable distribution of crude oil, residual fuel oil, and refined petroleum products at equitable prices [Section 4(b)(1)(F)].

Because the regulations issued pursuant to the EPAA are designed to deal primarily with shortage conditions, an exemption is required to facilitate the attainment of the following EPAA objectives in the current period of adequate supplies:

- o preservation of an economically sound and competitive petroleum industry [Section 4(b)(1)(D)];
- o economic efficiency [Section 4(b)(1)(H)]; and,
- o minimization of economic distortion, inflexibility, and interference with market mechanisms [Section (4)(b)(1)(T)].

Further, an exemption should not have an adverse effect on allocating suitable crude oil to U.S. refineries [Section 4(b)(1)(E)], maintaining energy production, or providing for maximum use of refinery capacities.

Chapter II provides background information on the use, production, and distribution of aviation gasoline. Chapter III analyzes the historical interaction of supply, demand, and price, and explores the market structure for aviation gasoline during 1968-1978, prior to and during

imposition of allocation and price controls. Chapter IV examines aviation gasoline supply, demand, price, and market structure impacts of exempting aviation gasoline from controls. In Chapter V, the potential economic impacts of exemption are evaluated. Chapter VI provides a final summary of the DOE's findings and views in support of its judgment that aviation gasoline should be exempted from the Mandatory Petroleum Allocation and Price Regulations. .

CHAPTER II

BACKGROUND

This chapter provides background information regarding the characteristics, use, supply, and distribution of aviation gasoline.

Aviation gasoline is a petroleum fuel designed, in several different grades, for use in piston engined aircraft, but not turbine engined (jet or turboprop) aircraft. It is defined in 10 CFR 212.31 as all of the various grades of aviation gasoline included in ASTM D910-70 (American Society for Testing Materials) and in 10 CFR 211.142 as petroleum based fuels designed for use in aircraft internal combustion engines, and complying with MIL G-5572 specifications. Current specifications for the various grades of this product are in ASTM D910-75.

Characteristics

Although technically falling within the range of motor gasolines, aviation gasoline is more narrowly defined in its more restrictive boiling range (+90^o to +300^o F); its maximum Reid vapor pressure of 7 psi (to create a lesser volatility); its lower freezing point of -76^o F; its carefully controlled antiknock characteristics; and its chemical stability. The manufacturing process involves a blending of natural or straight-run gasolines with refined hydrocarbons produced through cracking, reforming, alkylation, polymerization,

isomerization and other crude oil refining processes. Various chemical components are added to this blend to supplement natural characteristics and to improve combustion. In fuels for civilian use, these additives are generally limited: to dye for grade identification; to tetraethyl lead to increase octane ratings; and to gum inhibitors. Military or other special use requirements may specify additional additives such as metal deactivators, antirust and antistall agents.

Use

Many different general aviation activities currently represent the primary demand for aviation gasoline. These cover the full spectrum of business and corporate flying, personal transportation, proficiency flying, sport flying and commercial activities such as air taxi, rental, and commuter airline operations. Additionally, general aviation covers a wide range of special purpose flying conducted by private or commercial interests and governmental institutions in support of agricultural production, safety and mercy missions, energy production, telecommunications, construction, weather observation and modification, flight instruction and law enforcement, as well as aircraft and aircraft engine development and testing. Together, these activities involve at least 783,900 pilots flying more than 186,600 aircraft and operating out of a system of nearly 14,000 airports (source FAA).

Approximately 73 percent of all general aviation operations are for business or commercial (including instructional) purposes, while 25 percent are for proficiency and personal flying and 2 percent for other flying. Forty percent of general aviation fuel is aviation gasoline. The rest is aviation jet fuel [mostly kerosene base jet fuel (kerojet) plus negligible volumes of naphtha jet fuel]. General aviation use of aviation gasoline has held relatively level during the 1968-1975 period, with increases in 1976 and 1977. Its use of jet fuels has been growing much more rapidly. General aviation used 68 percent of the aviation gasoline consumed nationally in 1975. This percentage increased to 80 percent in 1977 and is expected to continue increasing as the other uses of aviation gasoline diminish. The net result was a decrease in total aviation gasoline consumption until 1977 when total consumption began to increase slowly. In 1979 and 1980 airline and military aviation gasoline consumption will have been reduced to such a low level that further reductions will not be enough to counteract the expected continuing increases in general aviation demand.

Civil air carrier requirements for aviation gasoline, represented primarily by supplemental air carriers, contract carriers and intrastate airlines, are decreasing as such carriers convert to jet-powered equipment.

Military uses of aviation gasoline are diminishing rapidly as conversion to turbine-engined aircraft continues. Military uses include flight instruction, cargo transport, and limited tactical flying for reconnaissance, observation and transportation, mostly performed by the U.S. Army in small aircraft and helicopters.

In the interest of aircraft performance and safety, the antiknock quality of aviation gasoline is closely controlled, and different grades of fuel are specified for different engines and services. Grade designations rate the antiknock value both under normal cruising conditions and under takeoff or emergency conditions.

Grade 80/87 means that the fuel has a cruising rating of 80 octane and a takeoff rating of 87 octane. Antiknock values are usually given as octane numbers up to and including 100, and as performance numbers above 100.

During the peak demand period for aviation gasoline in the decade following World War II, civil air carrier, general aviation, and nearly all military aircraft were powered by spark-ignited, piston engines. The wide range of planes and services required production and marketing of multiple grades of fuel, including the standard grades of 80/87 (dyed red), 91/98 (dyed blue), 100/130 (dyed green), 108/135 (dyed brown), and 115/145 (dyed purple).

With the introduction of jet-powered aircraft and conversion of civil air carrier and military fleets to jet equipment, demand for aviation gasoline dropped sharply and the availability of multiple grades began to diminish. Grades 91/98 and 108/135 disappeared from the marketplace during the 1960's. Grade 115/145 is currently available for civilian use at only a few airport facilities. Military demand for this grade is sustaining present levels of production, and termination of military use would certainly accelerate phaseout of the 115/145 grade fuel. Presently military aviation gasoline purchases are two-thirds 115/145 and one-third 100/130. The only grades of aviation gasoline commonly available to civil aviation are 80/87 and 100/130. Currently grade 80/87 has been dropped by several suppliers, as part of a single grade marketing program that has been underway for nearly six years.

The growing popularity of turbine engined aircraft in general aviation (all of civil aviation except airline and all of government aviation except military) has been causing rapid increases in general aviation demand for kerojet and in the number of airports which offer that fuel. This, in turn, has forced Fixed Base Operators (FBOs) and suppliers to evaluate the economics of marketing multiple grades of aviation gasoline. FBOs are aviation service and fuel retailers. To avoid excessive capital investment, many FBOs, who traditionally marketed two grades

of aviation gasoline, converted one of their fueling systems to kerojet fuel. The system handling grade 80/87 usually represented the lesser demand and therefore usually has been the one eliminated, leaving grade 100/130 as the remaining grade of aviation gasoline available.

A large number of aircraft are designed to consume 80/87 grade which, nonetheless, represents a relatively small total volume of fuel. The Federal Aviation Administration (FAA) recorded 186,600 general aviation aircraft in the United States in 1978. Of these, 37.5% were single-engine piston aircraft with 1-3 seats, and 47.3% were single-engine piston aircraft with 4 or more seats. Nearly all of the first group and a large part of the second have low compression engines which burn the low-lead 80/87 grade. Thus, approximately two-thirds of the general aviation fleet is designed for grade 80/87. However, these are the least active aircraft with the lowest fuel consumption. The 1-3 seat group averages 91.8 flying hours per year. The 4 or more seat group averages 106.3 hours per year. In approximate terms, average hourly fuel consumption for these two groups of aircraft would range a few gallons either side of ten gallons per hour.

100/130 grade aviation gasoline is a higher performance product. It has about six times as much lead content as grade 80/87. When used in the engines designed for grade 80/87

it causes them to run poorly and to be prematurely removed for overhaul due to burned valves and other problems.

A new blend of grade 100/130, called grade 100/130 LL (low lead) (dyed blue) has been introduced for aircraft engines designed to use grade 100/130 and also to operate safely the small, older engines designed for grade 80/87. It contains two-thirds as much lead as grade 100/130, but nearly four times as much as grade 80/87. Because of its greater volumetric content of high value clear octane blending components, it is more costly than other aviation gasoline. Thus an increase in requirements for 100/130 LL aviation gasoline would impose demands on refineries that are similar qualitatively to those imposed by increased requirements for unleaded motor gasoline. However, the requirement for more sophisticated refining is not expected to cause any overall supply shortage because of the small volumes involved. These factors would apply regardless whether aviation gasoline were decontrolled.

As 100/130 LL was introduced, several refiners ceased production of 80/87 grade and/or the standard 100/130 grade, while others continued. The result is that there are differences in grade availability among regions and among airports carrying different brands.

There have been numerous reports that 100/130 LL is damaging engines designed for grade 80/87 and causing them to be prematurely overhauled. There are many indications that grade

100/130 LL does not now fulfill its design purpose of satisfactorily operating the smaller engines. However, there appears to be a possibility that modifications (mostly to valves) of the smaller engines may enable them to operate satisfactorily with grade 100/130 LL.

Until this situation has been resolved and an appropriate single grade fuel suitable for use in the smaller engines has been developed, there will continue to be spot or local shortages of either 80/87 or 100/130 LL grades. The FAA and the National Transportation Safety Board are actively seeking to identify the problem precisely and to seek a solution. The responsibility for the grade suitability issue primarily is vested in these two agencies.

Supply

The grade 80/87 issue notwithstanding, there is an adequate overall supply of aviation gasoline as explained herein. The grade suitability issue will not, in DOE's judgment, be significantly affected by aviation gasoline deregulation. However, removal of DOE regulations may give suppliers and consumers added flexibility with which to resolve any problem because they will no longer be constrained by base period relationships, volumes, or prices.

Distribution

More than 97.0 percent of the total aviation gasoline requirements are supplied by the 15 large integrated refiners. The comparatively small volume of product involved and its distribution to some 5,000 dealers (FBOs) and military

installations preclude general use of petroleum product pipelines for transportation of this fuel. Instead, transportation of blending stocks between refineries and of finished product from refinery gates to dealers or redistribution points customarily is by highway and rail transport facilities. Final deliveries frequently are accomplished by tankwagon.

Many suppliers have developed the capability of producing aviation gasoline at dispersed refinery locations or have executed exchange agreements as a means of offsetting distribution costs in serving regional needs. However, the exacting specifications, the relatively expensive blending stocks, the low overall product demand, the proportionately small requirements of individual dealers, and the relatively high cost of distribution combine to make aviation gasoline one of the most expensive refined petroleum products in the marketplace. These factors also discourage any extensive participation in this market by small refiners.

The market share of the fifteen (15) large integrated refiners (97.3 percent in the first half of 1978) has remained relatively stable since 1972 (98.6 percent). In 1977 the four largest refiners sold 64% of all aviation gasoline, and the eight largest sold 92%.

As shown in Table II-1, direct sales of aviation gasoline by refiners has declined steadily since 1972 with a slight upswing in 1977. Direct sales of 204 million gallons in 1977 were down 50 percent from 1972. Refiners have shifted a major portion of the aviation gasoline sales

TABLE II - 1
DISTRIBUTION OF AVIATION GASOLINE BY
REFINERS, 1972-1977
(in MM Gallons)

<u>Year</u>	<u>Total Refiner Sales</u>	<u>Product Sold Directly to Ultimate Con- sumers</u>		<u>Branded Product Sold to Indepen- dent Marketers</u>		<u>Nonbranded Product Sold to Independent marketers</u>	
1972	669	406	60.7%	260	38.9%	3	0.4%
1973	654	335	51.2%	317	48.5%	2	0.3%
1974	637	324	50.9%	311	48.8%	2	0.3%
1975	553	216	39.1%	334	60.4%	3	0.5%
1976	536	189	35.2%	344	64.1%	3	0.6%
1977	565	204	36.2%	353	62.4%	8	1.4%
1978 (1st half)	262	94	35.8%	163	62.1%	5	2.1%

SOURCE: DOE forms P-305 and P-306.

volume to branded independent marketers whose share of the national aviation gasoline market has increased from 39 percent in 1972 to 62 percent in 1977. Nonbranded product supplied to the independent sector accounts for about 1 percent of refiner sales of aviation gasoline.

In 1977, total domestic demand for aviation gasoline was 13,932 MB of which General Aviation used 80%, military 14%, airlines 5-1/2%, and aviation factories less than 1%. The total volume is less than 4 percent of all aviation fuel demand, about six tenths of one percent of the total volume of gasoline consumed annually throughout the nation, and less than three tenths of one percent of domestic demand for all petroleum products.

CHAPTER III

HISTORICAL CONDITIONS (1968-1978)

The historical interaction of supply, demand, and price of aviation gasoline, and the market structure of the petroleum industry are examined in this chapter in order to address the findings required by the EPAA. The following questions will be resolved:

- o Is aviation gasoline in adequate supply?
- o Will exemption of aviation gasoline from regulation result in shortages of other refined products?
- o Are competition and market forces adequate to protect consumers following an exemption of aviation gasoline?
- o Will exemption result in inequitable prices for any class of user?
- o Is the exemption of aviation gasoline consistent with attainment of the objectives of the EPAA?

In this chapter an overview of the period 1968 to 1978 provides a perspective for assessing the effects of exempting aviation gasoline from the Mandatory Petroleum Allocation and Price Regulations, which is discussed in Chapter IV.

CHRONOLOGY OF ALLOCATION AND PRICE CONTROLS

Allocation and price controls on petroleum products have been imposed at various times over the past several years as part of major U.S. economic regulatory programs beginning with the series of price controls established under the Economic Stabilization Program. The principal allocation and price controls involved, for purposes of this report, are as follows:

<u>Program</u>	<u>Effective Date</u>	<u>Description and/or Responsible Office</u>
Phase I	Aug. 15, 1971	Original Price Freeze Office of Emergency Preparedness
Phase II	Nov. 13, 1971	Mandatory Price Controls Price Commission
Phase III	Jan. 11, 1973	Voluntary Price Standards Cost of Living Council
Special Rule No. 1	Mar. 6, 1973	Mandatory Price Controls on Petroleum Industry Cost of Living Council
Voluntary Petroleum Allocation Program	May 10, 1973	Original Product Allocation Program on a Voluntary Basis Dept. of the Interior
Price Freeze II	June 13, 1973	Sixty Day Price Freeze Cost of Living Council
Phase IV	Aug. 19, 1973	Mandatory Price Controls Cost of Living Council
Emergency Petroleum Allocation Act of 1973 (EPAA) as extended and amended by the EPCA (12-22-75) and the ECPA (3-14-76)	Nov. 27, 1973	Mandatory Allocation and Price Regulations issued January 14, 1974 Federal Energy Office, Federal Energy Administration and the Department of Energy

The PHASE I CONTROLS consisted of a general price freeze imposed on all sectors of the U.S. economy for a period of 90 days under which prices were frozen at their August 14, 1971 level.

The PHASE II MANDATORY PRICE CONTROLS established ceiling prices for all industries based on Phase I prices, with limited adjustments allowed to reflect increased costs.

The PHASE III VOLUNTARY PRICE STANDARDS also applied to all industries generally. Under Phase III, increases above those lawfully in effect on January 10, 1973, were permitted to reflect increased costs without regard to profit margin limitations. Phase III voluntary controls had the effect of permitting the petroleum industry to correct the price imbalance between aviation gasoline and middle distillates that had prevailed under Phases I and II. However, Phase III also had the effect of permitting large increases in petroleum prices. As a result,

Phase III was amended by SPECIAL RULE NO. 1 on March 6, 1973, the first time price controls were established expressly for the petroleum industry. Under Special Rule No. 1, mandatory price controls were imposed on the sale of crude oil and refined petroleum products by firms with annual sales of \$250 million or more, which generally limited automatic price increases to a weighted average price of one percent above the January 11, 1973, base price levels. Because Special Rule No. 1 applied only to the 23 largest oil companies, petroleum prices continued to rise because of price increases by the uncontrolled portion of the petroleum industry.

The VOLUNTARY PETROLEUM ALLOCATION PROGRAM (VPAP) was developed to deal with increasingly frequent spot shortages of petroleum products, which had first appeared in late 1972. Through an April 30, 1973, amendment to the Economic Stabilization Act of 1970 (P.L. 93-28), Congress empowered the President to allocate petroleum products and crude oil to meet essential needs and to prevent anti-competitive effects caused by shortages. The VPAP was initiated on May 10, 1973, and set out guidelines for the petroleum industry for the allocation of products at all levels of distribution. The program relied on voluntary compliance.

PRICE FREEZE II was placed in effect on June 13, 1973, for a 60-day period, partly because of continuing increases

in petroleum prices, including increases in gasoline prices. This 60-day price freeze was imposed on virtually all consumer prices. At the same time, the Cost of Living Council was directed to develop Phase IV regulations which were to include measures to stabilize the price of petroleum products.

THE PHASE IV CONTROLS, developed during the 60-day price freeze, went into effect on August 19, 1973, with the exception of those for retail dealers which went into effect September 7, 1973, and provided for a comprehensive system for controlling petroleum prices at all levels of the petroleum industry. The Phase IV price controls are the basis for the Mandatory Petroleum Price Regulations now in effect under the EPAA.

THE EPAA, enacted November 27, 1973, under which the Mandatory Petroleum Allocation and Price Regulations were issued January 14, 1974, provided for comprehensive controls for both allocation and prices of petroleum products at virtually all levels of the petroleum industry. These regulatory programs were established to deal with the problems created by the reduction in supplies of petroleum products resulting from the October, 1973, Arab oil embargo. Controls established under these programs were designed to preserve in a shortage situation, to the extent possible, an economically

sound and competitive petroleum industry, including the competitive viability of the independent segments of the industry. Other controls implemented as part of these programs contained provisions to assure equitable distribution of refined petroleum products at equitable prices. Included among these controls is the Domestic Crude Oil Allocation (Entitlements) Program which was created to eliminate the competitive marketing advantages of those refiners with disproportionate access to price controlled domestic crude oil. By eliminating these advantages, costs are brought into approximate parity assuming that market competition will result in equitable prices for consumers of petroleum products. Under this program, refiners with greater than average access to low-cost "old" oil are required to make payments to refiners who use greater than average amounts of more costly domestic and imported crude oil, so that all domestic refiners, in effect, have equitable shares of the limited quantities of low-priced domestic crude oil. ^{1/}

Under the allocation portion of these regulatory controls, all regions and economic sectors are to receive, to the extent possible, equitable shares of

^{1/} Under the EPCA, price controls on both new and old domestic crude oil are to be phased out over a 40-month period which commenced February 1, 1976. The DOE has expanded its Entitlements Program to cover all domestic crude oil.

available crude oil and petroleum product. Accordingly, a priority allocation system was established for the distribution of petroleum products.

During the shortage that occurred as a result of the oil embargo imposed in October 1973, the allocation and price regulations achieved a substantial measure of success in easing the impact of the shortage. However, there are indications at this time--and have been for over four years--that adequate supplies of all refined petroleum products are available and controls are no longer needed. During 1976, the Federal Energy Administration was able to make the necessary findings to support the exemption from regulation for several other categories of petroleum products including residual fuel oil (effective June 1, 1976), middle distillates (effective July 1, 1976), naphthas, gas oils, and other specialty products (effective September 1, 1976), and naphtha-base jet fuel (effective October 1, 1976). Recently, the DOE and the Federal Energy Regulatory Commission have held hearings on Findings to exempt motor gasoline from regulations. Also in 1976, the Energy Conservation and Production Act, P. L. 94-385 (enacted on August 14, 1976) exempted stripper well crude oil production from FEA's price regulations.

SUPPLY/DEMAND

The demand for aviation gasoline decreased fairly steadily from 1968 to 1976, as illustrated in Figures III-1 and III-2. The annual rate of decline in demand averaged

MB/D

Figure III-1

Figure III-2

DEMAND BY PAD FOR AVIATION GASOLINE

da

Source: BOM

about 13 percent from 1968 to 1972, before leveling in 1972 at 16.9 million barrels, or an average of 46,243 barrels per day (Table III-1). In 1975 demand fell by 13 percent from the previous year, to 14.1 million barrels while a further 5 percent drop to 13.4 million barrels occurred in 1976. In 1977 there was a 4% increase in domestic demand over 1976, while the first half of 1978 shows a 1.4% increase over the like period in 1977. Demand was quite evenly distributed among the Petroleum Administration for Defense (PAD) Districts II, III, and V but lower in PAD I and IV (Figures III-2 and III-3).

Production, stocks and demand of aviation gasoline (Table III-2 and Figure III-5) have shown a steady decline since 1968. Stocks in 1977 represented an 80 day supply which is fully adequate. By comparison, kerojet fuel stocks average 35 days supply.

Due to the declining consumption of aviation gasoline, domestic production decreased 46.2 percent from 1968 to 1972, dropping from 31.6 million barrels to 17.0 million barrels. In each of the years 1973 and 1974 production declined by 3 percent from the previous year's level. Production in 1975

Figure III-3

REFINERY OUTPUT OF AVIATION GASOLINE BY PAD

FIGURE III-4

PETROLEUM ADMINISTRATION FOR DEFENSE (PAD) DISTRICTS

TABLE III-1

SUPPLY AND DEMAND OF AVIATION GASOLINE, 1968-1978
(MB)

	<u>Production</u>	<u>Stocks</u>	<u>Exports</u>	<u>Domestic Demand</u>
1968	31,563	7,030	1,834	30,624
1969	26,460	6,193	1,746	25,551
1970	19,712	5,093	909	19,903
1971	18,457	4,419	1,239	17,892
1972	16,993	4,255	232	16,925
1973	16,413	3,939	198	16,531
1974	15,895	3,471	148	16,215
1975	13,718	3,024	106	14,067
1976	13,332	2,840	154	13,362
1977	14,220	3,046	82	13,932
1978*	6,470	2,654**	36	6,620

SOURCE: Bureau of Mines

* First 6 months of 1978 only. All others year end stocks.

** Aviation gasoline stocks traditionally reach their low point in the middle of the year.

FIGURE III-5

SUPPLY AND DEMAND FOR AVIATION GASOLINE

fell by 14 percent to 13.7 million barrels, by 3% to 13.3 million barrels in 1976, but increased 6.2% during 1977. Production fell again during the first half of 1978, by 4.4%. However, exports were virtually eliminated, slight volumes were imported, and stocks were drawn down so as to meet a slight, 1.3% increase in demand.

Throughout the 1968-1977 period production was less than demand in five years: in 1970, by 191,000 barrels; in 1973 by 118,000 barrels; in 1974 by 320,000 barrels; in 1975 by 349,000 barrels; and in 1976 by 30,000 barrels. Drawdown of stocks made up the differences in those years. In the years when production exceeded demand, the amount of the excess ranged from 939,000 barrels in 1968 to 68,000 barrels in 1972 and 89,000 barrels during 1977. There were no imports of aviation gasoline until the first half of 1978 when 12,000 barrels were imported. There were, however, exports of aviation gasoline in amounts that declined from 1,834,000 barrels in 1968 to 106,000 barrels in 1975; climbed slightly to 154,000 barrels in 1976, but dropped back to 82,000 barrels during 1977.

In 1977 domestic refinery output of aviation gasoline was 40.0 MB/D to meet demand of 39.2 MB/D and meet exports of 0.2 MB/D. Stocks were increased 0.6 MB/D. During the first six months of 1978, production fell short of demand by 1.4 MB/D. This 1.4 MB/D was made up primarily by stock drawdown but 0.03 MB/D was imported. Demand was fairly even from all PADs except IV. The major portion of output

came from PAD III causing refiners producing in PAD III to ship to PADs I and II. (Figures III-2, III-3, and III-4).

Table III-2 shows the annual rates of decline for production, stocks and domestic demand of aviation gasoline.

In contrast to the recent history of steadily decreasing total demand for aviation gasoline, general aviation demand has started increasing and the number of piston engine aircraft has been growing. Domestic shipments of piston engine aircraft rose from 7,394 units in 1970 to 16,904 units in 1977, according to the General Aviation Manufacturers Association. Net billings were at a record high level of \$1.48 billion during 1977, rising by 17% over 1976 which in turn, was 19% higher than 1975. The existing fleet grew from 126,000 units in 1971 to 186,600 units in 1978, with the corresponding increase from 23 million flight hours in 1971 to 38.6 million flight hours in 1978. Flight hours in 1978 showed a 5.2% increase over 1977 which was 4.6% higher than 1976. FAA forecasts a 4.8% annual growth rate through 1980 (data from Federal Aviation Administration).

A consideration affecting supply is the nature of the aviation gasoline market. Some major refiners market it aggressively and seek every opportunity to expand their market. Although aviation gasoline is a relatively higher-priced product, its profitability depends on the capitalization and operating costs of a complex distribution and marketing system. A new supplier would have to build a network of FBOs and support them in many different ways that can include such items as truck loan, lease or sale, and many others. A new supplier would

TABLE III-2

YEARLY RATES OF DECLINE
(INCREASE) AVIATION GASOLINE
Percent

	Production	Stocks	Domestic Demand
1969	16.2	11.9	16.6
1970	25.5	17.8	22.1
1971	6.4	13.2	10.1
1972	7.9	3.7	5.4
1973	3.4	7.4	2.3
1974	3.2	11.9	1.9
1975	13.7	12.9	13.2
1976	2.8	6.1	5.0
1977	(6.2)	(6.8)	(4.0)
1978*	4.4	4.6	(1.4)

SOURCE: BOM

* Six months

hesitate to set up such a structure; an existing supplier would hesitate to abandon it. Similarly, distribution in small volumes to many airports requires a complex infrastructure.

There have been occasional changes among refiners in emphasis on aviation gasoline. These have caused temporary, localized or regional supply imbalances, but not an overall supply shortage. Such supply disruptions occurred prior to and during controls, and are expected to continue to the same limited extent upon aviation gasoline deregulation.

Price Trends

This section traces aviation gasoline price trends for the period 1968-1978. Prices remained relatively stable during Phases I through III of controls. Phase IV controls (beginning on August 19, 1973), however, were ineffective in counteracting the forces that were causing prices to rise, because they permitted product cost passthrough at a time when imported crude oil was increasing rapidly in price and was also increasing as a proportion of all crude oil used.

Retail prices for the various general aviation segments of civil aviation vary widely. Historical average prices for this aviation segment are difficult to determine because of varying transportation costs and sales volume, the degree of competition, differing state taxes, local fees, and the amount of service given to purchasers. An effort to average such data from 1968 through 1975 appears in Table III-3. As indicated in this table, May 1977 aviation

gasoline prices averaged approximately 43 cents per gallon over the 1968 to 1973 period. Prices rose substantially in 1974 and 1975, although at much smaller rates of increase than crude oil prices. This is because so much of the total aviation gasoline price is composed of distribution and service costs which increased at a slower rate than product costs.

In June 1977, FEA compiled price data from 310 FBOs which was collected in April and May by several major refiners, the National Air Transportation Association and the FEA's Regional Offices (Table III-4). All of these FBOs sold grade 100/130 aviation gasoline and 38.7 percent of them sold 80/87 grade. The price of grade 80/87 averaged 2.8 cents per gallon less than grade 100/130. The nationwide average price for grade 100/130 was 81.5 cents per gallon, with a range from 68.7 cents to \$1.03. The 80/87 grade average was 78.7 cents with a range from 66 cents per gallon to 90 cents.

Wholesale refiner prices averaged 42.6 cents per gallon in 1976, 46.6 cents per gallon in 1977, and 50.1 cents per gallon through September 1978. In the month of September 1978 refiner wholesale prices were 52.6 cents per gallon and refine retail prices were 54.0 cents per gallon.

Wholesale military aviation gasoline prices for 1976 and 1977 averaged 44.1 cents per gallon for 100/130 and 115/145. The large disparity between retail general aviation and wholesale military prices results primarily from larger sales volumes purchased by the DOD, lower transportation costs, the absence of service costs and exemption from sales taxes.

TABLE III-3

AVIATION GASOLINE RETAIL FUEL PRICE*
(Annual Average in cents per gallon)

<u>Year</u>	<u>Aviation Fuel Grade</u>	
	<u>80/87</u>	<u>100/130</u>
1968	40	41.7
1969	42	43.0
1970	42	43.4
1971	42	43.7
1972	43	44.2
1973	47	48.6
1974	64	65.7
1975	68	70.2

SOURCE: Aviation Data Service, Inc. survey
for Federal Aviation Administration
in 1975 and not updated.

* Includes applicable State and Federal Taxes

TABLE III-4

PRICES OF AVIATION GASOLINE SOLD AT RETAIL BY FIXED
BASE OPERATORS BY GRADE AND BY REGION. MAY 1977
(prices in cents per gallon)

<u>Region</u>	<u>Grade</u>	
	<u>80/87*</u>	<u>100/130*</u>
Northeast	80.24	81.47
Southeast	77.90	80.31
North Central	77.59	81.90
South Central	76.82	80.51
Northwest	80.24	85.19
Southwest	79.37	81.89
Average (weighted)	78.7	81.5

SOURCE: DOE, based on data from 310 FBOs assembled by several major refiners, the National Air Transportation Association, and DOE Regional Offices.

* All 310 FBOs sold 100/130. 38.7% of them also sold 80/87. The price differential between 80/87 and 100/130 ranged from extremes of 0 cent to 7 cents, and averaged 2.8 cents per gallon.

General aviation gasoline demand remained relatively stable from 1973-1976, but increased during 1977 and the first six months of 1978. In the face of the upward movement of prices this demonstrates that demand for aviation gasoline is relatively inelastic with respect to price over the historic range of prices.

Market Structure

Major refiners dominate production of aviation gasoline. Fifteen refiners have accounted for a market share of aviation gasoline that has remained relatively constant from 98.6% in 1972 to 97.3% in the first half of 1978. Participation by small independent refiners is negligible.

General aviation is responsible for 80% of aviation gasoline demand. General aviation represents all government aviation except military and all civil aviation except civil air carriers. Most sales to general aviation are retailed through a network of about 5,000 FBOs. Nearly all FBOs are branded, independent marketers. Wholesalers and unbranded marketers are very rare. Occasionally, some large general aviation interests purchase portions (for use at their home base) of their fuel wholesale from refiners, but this is the exception.

Military aviation consumed 15% of domestic aviation gasoline in 1976 and 14% in 1977. This represents a sharp drop as compared to 1970. The Defense Fuel Supply Center (DFSC) purchases these volumes under contract.

The civil air carriers consumed less than 6% of domestic aviation gasoline in 1977. In the early 1950s they consumed no other aviation fuel. Their aviation gasoline use dropped rapidly during the 1960s coincident with the conversion to kerojet fuel, but the rate of decline slowed in the 1970s. Airlines buy aviation gasoline under contract from refiners in most cases.

Aircraft manufacturing activities consume less than 1% of aviation gasoline for engine development, flight testing, production flying, etc. Much of this small volume is under contract from a refiner.

CHAPTER IV

IMPACT OF DECONTROL ON SUPPLY/DEMAND, PRICE, AND MARKET STRUCTURE

This chapter considers future demand, supply, price, and market structure conditions, and assesses the impact of exempting aviation gasoline from Mandatory Petroleum Allocation and Price Regulations. The principal questions raised by the EPCA are:

- o Will exemption of aviation gasoline from regulation result in shortages of aviation gasoline or any other refined product?
- o Will exemption result in inequitable prices for any class of user of aviation gasoline?
- o Will competition and market forces be adequate to protect consumers following an exemption of aviation gasoline from regulation?

To answer these questions, the following analytical approach has been taken:

- o Demand forecast -- A demand forecast for aviation gasoline and all refined products was developed for the period 1978-1980.
- o Supply forecast -- The availability of refining capacity and crude supply on both a domestic and worldwide basis to meet forecast demand has been evaluated.

- o Pricing forecast -- The price movement pressures arising from foreign market prices, alternate product prices, and the competitive structure of the industry have been assessed.
- o Market structure and competition -- Trends that may affect future competition of the major industry segments have been examined.

DEMAND FORECAST

As described in Chapter III, and quantified in Table IV-1 and Figure IV-1, domestic demand for aviation gasoline decreased from 83.9 MB/D in 1968 to 37.1 MB/D in 1976. Then, in 1977, as declining military demand began to stabilize at a relatively irreducible level, continuing growth in general aviation demand caused total demand to begin a gradual increase. Continuation of this trend was expected by the Federal Aviation Administration in its September 1978 publication "Aviation Forecasts" and in Defense Fuel Supply Center estimates.

Aviation gasoline demand in relationship to overall petroleum product demand is shown in Table IV-2. In 1977, it represented about two-tenths of one percent of all domestic petroleum product demand.

SUPPLY ANALYSIS

To assess the adequacy of all petroleum product supplies relative to forecast demand, the key supply determinants

TABLE IV-1

DEMAND FOR AVIATION GASOLINE

<u>Year</u>	<u>MB/D</u>
1968	84
1969	70
1970	55
1971	49
1972	46
1973	45
1974	44
1975	39
1976	37
1977	38
1978*	39
1979**	41
1980**	43

Source: 1968 to 1977 data from BOM

* DOE estimate based on BOM data for first six months of 1978.

** ERA estimate based on FAA "Aviation Forecasts Fiscal Years 1978-89," and DFSC estimates.

FIGURE IV-1
DEMAND FOR AVIATION GASOLINE

Source: Table IV-1

TABLE IV - 2

PROJECTED DOMESTIC PETROLEUM PRODUCT DEMAND
(Thousands of barrels per day)

	<u>1977</u>	<u>1978*</u>	<u>1979*</u>	<u>1980*</u>
Kerojet Fuel	835	900	900	900
Naphtha Jet Fuel	205	200	200	200
Aviation Gasoline	38	39	41	43
Other Products	17,340	18,161	18,759	19,757
Total Domestic Demand	18,418	19,300	19,900	20,900
Exports & Crude	259	200	200	200
Oil Losses				
Total Demand	18,677	18,900	20,100	21,100

* Projections are rounded to the nearest 100,000

NOTE: Numbers may not sum to totals because of rounding.

SOURCE: Data for 1977 is actual demand as reported in the Monthly Energy Review and 1978 is preliminary actual data. Demand projections for 1979 and 1980 are derived from EIA's Analysis Memorandum DOE/EIA-0102/20 based on macroeconomic forecasts by Data Resources, Inc. (DRI's CONTROL0727 macroeconomic simulation). Aviation gasoline and jet fuel demand projections are prepared by the Economic Regulatory Administration, based on forecasts by the Federal Aviation Administration and the Air Transport Association of America. Since ERA forecasts for aviation turbine fuel demand differ slightly from those produced from EIA's Short Term Petroleum Demand Forecasting Model, the difference is reconciled by modifying the EIA forecast for "Other Products" to stay consistent with the Total Demand derived from the STPDFM.

of refinery capacity, refinery yields, and crude oil supply were analyzed. For this analysis, the Economic Regulatory Administration of DOE has relied upon the Analysis Memorandum (DOE/EIA-0102/20) entitled "Petroleum Supply/Demand Estimates and Cost of Petroleum Imports, 1978-1980, December 1978." The supply of aviation gasoline is expected to be adequate to meet overall demand through 1980.

Domestic refinery capacity, as shown in Table IV-3, is projected to increase by 900 thousand barrels per day from 1978 to 1980. The increase in total domestic petroleum demand from 1978 to 1980 is projected to be 2,200 thousand barrels per day. To meet total demand for refined products in 1980, imports will increase by over 1,100 MB/d from the 1978 level. Utilization of refinery capacity is projected to increase to 90.0 percent by 1980. Although it is high, this rate is comparable to those achieved in the past. (Table IV-4).

Table IV-5 indicates that continued operation of domestic capacity at the forecast rate of 90.0 percent refinery utilization would satisfy projected demand for aviation gasoline of 43 MB/D in 1980.

On a product-by-product basis, some slight shifts in yield are likely, depending on specific demand developments conditioned by weather characteristics and other factors.

TABLE IV-3

U.S. PETROLEUM SUPPLY ANALYSIS
(MB/D)

	<u>1977</u>	<u>1978****</u>	<u>1979</u>	<u>1980</u>
Refinery Capacity*	16,388	17,200	17,700	18,100
Percent Utilization**	89.1%	88.0%	90.0%	90.0%
Anticipated Utilization	14,608	15,100	15,900	16,300
Product Imports	2,176	2,000	2,500	3,100
Natural Gas Liquids	1,618	1,600	1,500	1,500
Other***	<u>275</u>	<u>200</u>	<u>200</u>	<u>200</u>
Total Supply	18,677	18,900	20,100	21,100

*DOE's Trends and Refinery Capacity and Utilization," September 1978.

Estimates do not include Puerto Rico and Virgin Islands, which contribute approximately 1 million barrels per day additional capacity but whose product shipments to the U.S. are considered as imports.

**Based on crude inputs only.

***Includes processing gain, other hydrocarbon inputs, stock change, and unaccounted-for crude oil.

****Preliminary Actual

NOTE: Numbers may not sum to totals because of rounding.
Percentages based on unrounded numbers.

TABLE IV-4
DOMESTIC REFINERY CAPACITY UTILIZATION

<u>Year</u>	<u>Percent Crude Oil Input to Capacity</u>
1968	90.6
1969	90.6
1970	88.6
1971	87.2
1972	88.4
1973	89.8
1974	83.9
1975	84.2
1976	87.0
1977	89.1
1978	88.0 preliminary
1979	90.0 projected
1980	90.0 projected

SOURCE: U.S. Bureau of Mines, 1968-1973. DOE 1974-1980.

TABLE IV-5

PROJECTED AVIATION GASOLINE PRODUCTION, 1980
(MB/D)

Projected U.S. Refinery Capacity.	18,100
Projected Utilization	90.0%
Estimated Domestic Refinery Production, 1980	16,300
Estimated Aviation Gasoline Yield	.26%
Estimated Domestic Aviation Production.	43
Aviation Gasoline Demand.	43

These shifts in product yields have been demonstrated historically and are clearly within the range of industry capability. In fact, new technology in refining allows more flexibility in the yield mixes of new refineries than was possible in the past. Regardless of actual refinery capacity utilization, aviation gasoline represents such a small part of production that demand can be met without significantly affecting yield patterns.

Adequate aviation gasoline supply will continue to be available as long as overall gasoline supply is adequate. DOE projects overall gasoline supplies will be adequate through 1980.

Availability of Crude Oil

Supply projections indicate that increasing amounts of imported crude oil will be refined domestically, and that imports of refined product will increase somewhat. Crude oil imports are projected at the following levels:

<u>Year</u>	<u>MB/D</u>
1975	4,105
1976	5,287
1977	6,548
1978*	6,000
1979*	6,700
1980*	7,600

* Does not include imports for Strategic Reserve Program.

If there were no major supply interruption worldwide, sufficient production capacity would be available in foreign countries to meet the increased demand for crude imports. Thirteen OPEC countries, Canada, and Mexico together had a total theoretical crude oil production capacity of approximately of 40.4 million barrels per day in September 1978. They actually produced only 34.5 million barrels per day. These countries are thus theoretically capable of producing an additional 5.9 million barrels per day provided such a level of demand exists.

Up to 3.5 MMB/D of this excess production capacity has been utilized to offset most of the recent termination of exports from Iran. The remainder is being met by the drawdown or currently abundant stocks. A return of Iranian exports to even half of their previous level which is the minimum that is expected, should eliminate any need to draw down inventories below normal levels.

Thus, the crude oil supply is expected to be adequate to meet demand for all aviation gasoline through 1980. If Iranian exports should remain at zero for a prolonged period, which is not expected, there could develop some tightness of supply for all refined products on a worldwide basis. It is not expected that such tightness would require the reimposition of controls on any exempted product, although the possibility of activating DOE's Standby Product Allocation and Price Regulations (which were issued 44 FR _____, January 18, 1979), is always available.

PRICE FORECAST

Rising crude oil prices and increased refiner cost pass-throughs will tend to increase aviation gasoline prices with or without controls. Domestic crude costs will rise as permitted under the provisions of the EPCA. While it is not difficult to project the full impact of the recent 14.5 percent increase in OPEC crude prices, an assumption must be made as to the possibility of further increases in 1980. As the volume and percentage of imported crude oil increases through 1980, the average costs of crude oil to U.S. refiners is assumed to rise at a higher rate than the rate of inflation.

Projected crude oil cost increases for refiners and accompanying nonproduct cost increases, assuming levy of full OPEC increases and modest economic growth, are shown in Table IV-6. Assuming that the rising crude costs are allocated to all refined products on a percentage of sales basis,

TABLE IV-6

PROJECTED COMPOSITE CRUDE COST AND NONPRODUCT
COST INCREASES WITH CONTROLS
(cents/gallon)

<u>Year and Qtr.</u>	<u>Cumulative Crude Oil Cost Increase Over 3rd Qtr. 1978 Cost</u>	<u>Cumulative Increase in Refiner Non- product Costs</u>	<u>Total Cumulative Increase</u>
<u>1978</u>			
4th	.2	.2	.4
<u>1979</u>			
1st	1.0	.5	1.5
2nd	2.3	.7	3.0
3rd	3.0	1.0	4.0
4th	3.8	1.3	5.1
<u>1980</u>			
1st	5.4	1.5	6.9
2nd	6.1	1.8	7.9
3rd	6.3	2.1	8.4
4th	6.6	2.4	9.0

NOTE:

Nonproduct cost increases are derived by inflating historical refiners' gross margins by the projected GNP implicit price deflator from the Data Resources, Inc. PESSIMO0524 macroeconomic simulation. Costs of increased refining capacity is not included. Crude oil costs include the 14.5 percent 1977 OPEC increase and a 7 percent 1980 OPEC increase, equivalent to the projected U.S. rate of inflation.

SOURCE: EIA Short-term Petroleum Cost Distribution Model (11-3-78)

controlled aviation gasoline price increases should closely follow those refiner cost increases. Thus, additional crude and nonproduct costs could cause the price of aviation gasoline to increase by the end of 1980 regardless of whether controls are maintained. Accordingly, the discussion in this chapter focuses on the effects resulting solely from exemption of aviation gasoline from controls.

Five factors must be evaluated in assessing the effect on price movement of aviation gasoline decontrol:

1. Banked Costs
2. Supply/Demand
3. Nature of the Market
4. Alternate Product Value
5. World Price

In this section, the implications for prices due to these factors are assessed, with a focus on how controls exert influence on these factors.

1. Banked Costs

Under current DOE regulations, a refiner is permitted to pass through increases in product costs and nonproduct costs subject to certain constraints. Such costs not recouped during the month after they are incurred can be carried forward (i.e. banked) for future use with certain limitations.

DOE price regulations include aviation gasoline in the category termed "general refinery products." In addition to aviation gasoline, this group also includes propane, butane, and natural gasoline, and prior to their exemption from controls, included those products allocated under Subparts J and K of the Mandatory Petroleum Allocation Regulations (naphthas, gas oils, benzene, toluene, mixed xylenes, hexane, lubricants, greases, solvents, lubricating base stock oils, and process oils), residual fuel oil, and middle distillates other than No. 2 oils. Under the price rules no costs attributable to exempt products may be reallocated to covered products.

The combination of several products in one bank for general refinery products complicates analyzing the effect of banked costs, in that costs can be allocated to different products within the category as the refiner deems appropriate, or to motor gasoline, another controlled product. However, the bank of unrecovered costs that could have been passed through to aviation gasoline under current regulations, and was not, may be taken as some evidence that competitive forces are precluding their passthrough and should continue to do so subsequent to exemption from controls. Large banks are an indicator that market forces, rather than DOE price controls, have established current wholesale price levels (Table IV-7). Price levels set by market forces would not be changed by exemption of aviation gasoline from price controls.

TABLE IV-7

UNRECOUPED COSTS FOR
GENERAL REFINERY PRODUCTS FOR 30 LARGEST REFINERS*

(\$/millions)

	<u>October 1976</u>	<u>October 1977</u>	<u>October 1978</u>
Total Bank	1,471	1,651	1,397
General Refinery Products	426	451	628

SOURCE: Energy Information Administration
P110-M-1 and EIA-14,

* As of December 27, 1978

2. Supply/Demand

Previous discussion of supply/demand indicates that adequate product supplies can be made available and that no overall shortage exists or is expected. As previously discussed, sufficient refinery capacity exists to meet demand. Sufficient incentive exists to ensure production that will meet demand. Therefore, no pressures for increased prices can be ascribed to potential shortages or capacity constraints, except for possible slight cost pressures caused by need to engage in more sophisticated refining in order to produce greater volumes of 100/130 LL (low-lead).

3. Nature of the Market

As discussed below, under the "Market Structure Forecast" section of this chapter, decontrol of aviation gasoline is not expected to affect the market structure of aviation gasoline nor have any supply/demand impacts. The present dominance of this market by a few large refiners is expected to continue. Any low-volume, high quality product is likely to attract profit-taking needs. In light of increasing demand for unleaded motor gasoline, the value of high clear-octane gasoline components can be expected to increase under lead-phasedown requirements, and the growth of low-lead aviation gasoline as a percent of total supply can be expected to increase the overall value of this product. Because of this, one refiner testified there may be moderate pressures to make this product more attractive to refiners.

The margin for aviation gasoline is not determined solely by the refinery costs and profits. The FBO and the refiner provide a wide variety of additional services for this product. Marketing often requires use of retail sales facilities in which the refiner has invested and which are expected to justify their existence financially.

A recent industry survey indicates the probability that, at least among some Fixed Base Operators and in some regions, nearly all of the 4 cent per-gallon non-product costs pass-through authorized by the DOE has, in fact, been passed through. This factor suggests some pressure for a price increase at the retail level that will vary from region to region and from airport to airport. It will probably average one cent per gallon, approximately, but the range could be from zero to as much as 4 cents per gallon at some airports where costs are unusually high and competition is low. Transportation costs will be charged where they are incurred in the event of deregulation instead of being averaged as is now being done. If prices are determined solely by cost increments, this third factor (transportation costs) will not change the average price of aviation gasoline; in such a case it could cause prices at some airports to drop, while they increase by a like amount at others. However, some FBOs have had to absorb unusual costs, such as increased flowage fees, which others have not experienced. We could expect to see these increases passed through.

Thus, the three factors mentioned in this section will probably create a "best case" situation at many airports

with perhaps as much as a 4 cents per gallon increase. However, the nationwide average effect of these three factors is forecast to remain less than 1-1/2 cents per gallon through 1980. Comments received from consumer groups indicate acceptances of such price increases to assure continued adequacy of supplies.

4. Alternate Product Value

Alternate product value will continue to be a factor affecting aviation gasoline prices following deregulation. Refiners could substantially change production of aviation gasoline without noticeably affecting the yield of motor gasoline, which is the primary alternate product. The profitability of producing aviation gasoline as compared to motor gasoline or naphtha jet fuel (another alternate product) is a factor in determining a refiner's incentive to produce aviation gasoline. Automotive gasoline is such a massive market in the United States that wholesale motor gasoline pricing strongly influences wholesale aviation gasoline pricing. Thus, if the price of motor gasoline should rise, there would be heavy pressure for an aviation gasoline price increase, although any such increases would not be the direct result of the deregulation of aviation gasoline.

5. World Price

World price of refined products can be a factor in the pricing of domestically-consumed petroleum products. As the prices of crude oil and petroleum products outside the United States are not under control, their prices are sometimes thought to set the domestic uncontrolled price.

World price has, however, no measurable effect on the price of domestic aviation gasoline. Virtually no aviation gasoline is imported and small volumes are exported.

MARKET STRUCTURE FORECAST

Large refiners (175,000 B/D and up and who own or control 30 percent or more of their refinery feedstocks) manufactured and sold 97.3 percent of the aviation gasoline product in the first half of 1978, with the eight largest having 92 percent of the market.

The small market for aviation gasoline will probably remain relatively level for the next year or two. Military piston aircraft will be replaced by turbo-props and jets, but the trend will be offset by increasing numbers of piston aircraft joining the general aviation fleet.

Because of the small size and current growth characteristics of this market, it is not expected that competition for the aviation gasoline market will show major changes. Deregulation of aviation gasoline will have no effect on the market structure or the supply and demand patterns of this market.

SUMMARY AND CONCLUSIONS

In this section, the analyses of demand, supply, pricing factors, and market structure are consolidated along with DOE's findings to answer the three questions presented at the beginning of this chapter.

"Will exemption of aviation gasoline from regulation result in shortages of aviation gasoline or any refined product?"

DOE finds that the supply of aviation gasoline through 1980 will be adequate and that exemption will not result in shortages of aviation gasoline or other products. Refining capacity is projected to be adequate to meet any increases in demand for aviation gasoline. Aviation gasoline deregulation would cause no supply problems with other refined products. Furthermore, DOE finds that the access of each sector of the industry to adequate supplies at equitable prices will not be affected by aviation gasoline exemption.

Will exemption of aviation gasoline result in inequitable prices for any class of users of aviation gasoline, and

Will competition and market forces be adequate to protect consumers following an exemption of aviation gasoline regulations?

The changing cost of crude oil is a major cause of price changes in aviation gasoline. Crude oil costs are expected to increase by as much as 6.6 cents per gallon by the end of 1980 (Table IV-6) under crude oil price control provisions. This crude oil cost increase to domestic refiners will create direct pressure for price increases on all products including aviation gasoline even if price controls on aviation gasoline are continued, because current regulations permit refiners to recover increased crude oil costs. Additional increases of up to 2.4 cents per gallon for increased refiner nonproduct costs could also occur, even under controls.

The factors discussed below demonstrate that only slight aviation gasoline price increases are expected to result if this product is exempted from controls. DOE's views as to the effects of each of these factors on prices can be summarized as follows:

Banked Costs. Because aviation gasoline is included in the "other products" category, its bank is mixed in with "general refinery products" banks. The fact that a bank of costs that could be passed through to aviation gasoline does exist is an indication that aviation gasoline prices at the refiner level are not being constrained by DOE pricing regulations and that there should be little pressure for price increase following deregulation. Market forces may be restraining prices at levels below the maximum authorized by DOE price controls.

Supply/Demand. Supply of crude oil is adequate, and is forecast to remain so through 1980 considering the the current drawdown of large crude inventories to deal with the current loss of Iranian supplies, which is expected to be temporary. Aviation gasoline refining capacity is adequate to meet present demand and the slight demand increase forecast for 1980.

Nature of the Market. Exemption of aviation gasoline from regulations will not adversely affect the competitive viability of refiners and marketers. The small size and present structure of the aviation gasoline market is not expected to change as a result of deregulation. Individual regional and airport circumstances will generate pressures

for aviation gasoline price increases averaging less than 1-1/2 cents per gallon overall, but larger increases or decreases in local markets will be noticed.

Alternate Product Value. If the prices for alternate products, primarily motor gasoline, but also kerosene and naphtha jet fuel were to increase because of a demand pull, this could impose upward pressure on aviation gasoline prices beyond those that would exist under continued controls.

Summary

Deregulation of aviation gasoline is not expected to have any impact on supply/demand, or market structure. A slight upward impact on price, not likely to exceed 1-1/2 cents per gallon, is possible. However, competition could preclude the realization of any average price increase as a result of deregulation.

CHAPTER V

IMPACT OF EXEMPTION OF AVIATION GASOLINE ON THE ECONOMY

THE EPAA, as amended by the EPCA, requires that DOE state its views concerning the potential economic impacts (if any) of exempting aviation gasoline from control.

Where practicable, these views should include:

- o State and regional impacts, including effects on governmental units.
- o Effects on the availability of consumer goods and services and the Gross National Product (GNP).
- o Effects on employment and consumer prices, specifically, the rate of employment, the Consumer Price Index, and the implicit deflator for GNP.

Three major factors link the energy sector to the rest of the economy: energy prices, energy supply conditions, and energy demand conditions. Relative to an alternative situation, the changes in these factors implied by a given change in energy regulations may have a variety of impacts on the economy, some of a positive and some of a negative nature. As a result of this ambiguity, questions concerning the economic impacts of changes in energy regulations are inherently empirical and, as such, their answers must involve a quantitative analysis.

In evaluating the quantitative impacts of changes in energy regulations, it is useful to distinguish between direct and indirect impacts. Changes in the energy sector typically have a direct impact on prices, employment, and output in the energy sector, and these energy sector impacts, in turn, have a direct effect on GNP, total employment, the CPI, and other economic variables. In addition to these direct impacts, changes in energy regulations have indirect effects on the prices and production of non-energy goods and services. The indirect impacts result from the complex interdependencies that characterize the U.S. economy.

In order to capture the indirect impact of changes in energy regulations, DOE uses simulations of large macroeconomic models to study the quantitative impacts of such changes in energy regulations. The methodology rests on the incorporation of the estimated energy sector impacts of the regulatory change into the appropriate variables in a macroeconomic model. For a given change in energy regulations, a control simulation of a macroeconomic model is modified using outside estimates of the energy sector impacts, and the model is then resimulated over a forecast period. Differences between the results of the two simulations are used to measure the economic impacts of the change in energy regulations.

According to the discussion in earlier chapters, exemption of aviation gasoline from controls would have no significant impact on the price or availability of any petroleum product. As the discussion of this Chapter has made clear, any economic impacts resulting from a proposed change in energy regulations would be in response to changes in the energy sector. Consequently, exemption of aviation gasoline from controls would have no economic impact measured by any of the criteria specified in Section 12 of the EPAA.

CHAPTER VI

FINDINGS AND CONCLUSIONS

This chapter states DOE's findings and views concerning the possible exemption of aviation gasoline from the Mandatory Allocation and Price Regulations. Section 12 of the Emergency Petroleum Allocation Act of 1973 (EPAA), which was added by the Energy Policy and Conservation Act (EPCA), requires that DOE make certain findings and express its views on a variety of matters in proposing to Congress that a product be exempted from regulations. As indicated in Chapter I, since DOE is submitting to the Congress concurrent energy actions exempting aviation gasoline from both pricing and allocation regulations, the findings and views contained herein address both of the exemptions.

DOE's findings and views expressed in this chapter are drawn from the combined analyses presented in Chapters III and IV. These findings and views are grouped under five general headings: (1) findings related to supply and demand, required for exemption from allocation regulations; (2) findings related to price, required for exemption of aviation gasoline from price regulations; (3) DOE's findings that exempting aviation gasoline from regulation will be consistent with the objectives of the EPAA; (4) DOE's views on a variety of potential impacts

that must accompany any exemption submitted to Congress, including state and regional impacts; and (5) DOE views related to the effects of exempting aviation gasoline from regulation upon employment, the Consumer Price Index, the availability of consumer goods and services and the Gross National Product.

(1) Findings Related to Supply and Demand

In exempting of any oil or refined product from the allocation regulations, the Department of Energy (DOE) must determine "...that such oil or refined product category is no longer in short supply..." [Section 12(d)(1)(A) of the EPAA]. Chapters III and IV present DOE's examination of the supply/demand situation of aviation gasoline. DOE finds that aviation gasoline is not in short supply and that anticipated supplies of aviation gasoline will be sufficient to meet the demand over the near term. Similarly, stocks of aviation gasoline are sufficient to meet demand surges.

The total supply of aviation gasoline will be adequate over the 1979-1980 period, and exemption will not result in shortages of aviation gasoline and other products. With projected expansions, domestic refinery capacity is expected to be more than adequate to meet aviation gasoline demand. Sufficient supplies of foreign crude oil should be available, and the entitlements program will ensure

the availability of equitably priced crude oil to all domestic refiners. An analysis of the refinery yields required to meet aviation gasoline demand demonstrates that refineries have the flexibility to satisfy such demand.

Any exemption must also be accompanied by a finding "...that exempting such oil or refined product category will not have an adverse impact on the supply of any other oil or refined petroleum product subject to the Act..." [Section 12(d)(1)(A) of the EPAA]. With average domestic refining capacity utilization projected to be 90.0 percent for 1980, capacity exists to meet the expected demand for aviation gasoline. DOE finds that exempting aviation gasoline will not have any adverse impact on the supply of other products.

The analysis of historical supply and demand in Chapter III, and the supply and demand forecast through 1980 in Chapter IV, fully support DOE's findings that aviation gasoline is now, and will continue to be, in adequate supply to meet current and projected demand.

(2) Findings Related to Price

In proposing exemption from price regulations, the DOE must determine "... that competition and market forces

are adequate to protect consumers..." [Section 12(d)(1)(B) of the EPAA]. Aviation gasoline prices will increase as crude costs and other costs increase. Supply and demand are substantially in balance and are expected to remain in balance. Competition is expected to increase slightly or remain at current levels. The removal of controls (under which cost increases may presently be passed through to consumers) will have only slight incremental effect on prices of most refiners generally and for most individual refiners, although it will reduce price pressures on some refiners that may have minimal or no banks. Overall price increases resulting from exemption are not likely to be as much as one cent per gallon at the refiner level. It is DOE's finding, therefore, that competition and market forces are adequate to protect consumers if aviation gasoline is exempted from regulations.

The DOE must also accompany any exemption from price regulations with a finding "...that exempting such oil or refined product category will not result in inequitable prices for any class of users of such oil or product..." [Section 12(d)(1)(B) of the EPAA]. Since only a slight price increase is projected to occur as a result of exemption, and since the market structure analysis in Chapter IV indicates little change in market structure from historical patterns as a result of exemption, DOE finds that exemption would not result in inequitable prices for any class of end-user.

With supply presently adequate, no major price increases for aviation gasoline, solely as a result of exemption, are expected to occur. Competition appears to be sufficient to protect both the independent sector of the petroleum industry and consumers.

(3) Consistency with the Objectives of the EPAA

The DOE, in submitting any exemption for Congressional review, is required to support such an action with a finding that it is "consistent with the attainment of the objectives specified in Section 4(b)(1)" of the EPAA.

It is DOE's finding that the exemption of aviation gasoline from the price and allocation regulations is consistent with the attainment of the objectives set forth in Section 4(b)(1) of the EPAA. Since an adequate supply is anticipated, the continued allocation and pricing controls of aviation gasoline are not necessary to protect the public health, safety and welfare and the national defense [Section 4(b)(1)(A)]; the maintenance of all public services [Section 4(b)(1)(B)]; the maintenance of agricultural operations [Section 4(b)(1)(C)]; or the maintenance of exploration for the production or extraction of fuels and

minerals [Section 4(b)(1)(G)]. Adequate supply and the positive effects of increased competition should insure that an exemption is consistent with the preservation of an economically sound and competitive petroleum industry [Section 4(b)(1)(D)]; the equitable distribution of crude oil, residual fuel oil and refined petroleum products at equitable prices [Section 4(b)(1)(F)]; economic efficiency [Section 4(b)(1)(H)]; and the minimization of economic distortions, inflexibility, and interference with market mechanisms [Section 4(b)(1)(I)]. An exemption should have no adverse effect on the allocation of suitable crude oil to U.S. refineries [Section 4(b)(1)(E)].

(4) DOE's Views Related to Potential Economic Impacts

Any exemption from either price or allocation regulations must be accompanied by "...a statement of the President's views as to the potential impacts (if any) of such (exemption) amendment..." [Section 12(d)(2)(A) of the EPAA]. This section of the EPAA further specifies a number of particular views which should be included, if practicable. In this section of the report, the DOE presents views of such potential impacts, presented in the order in which they are cited in the Act.

Views on the state and regional impacts (including impacts on governmental units). Because no supply, demand or significant price impacts are anticipated as a result of an exemption, no significant state or regional impacts

are anticipated. In particular, no impact is expected on any governmental units.

Views on the effects on the availability of consumer goods and services. Assessing the potential impacts on the availability of consumer goods and services as a result of exempting aviation gasoline involves consideration of the major uses of this product. General aviation and military aviation are dependent on this product and account for 80 percent and 14 percent of all aviation gasoline consumed, respectively. Since supplies of aviation gasoline have been determined in Chapter III and IV to be adequate to meet both present demand and demand over the 1979-1980 period, it is DOE's view that exemption will have no adverse impact on the availability of consumer goods and services.

Views on the effects on the Gross National Product. Assuming no significant price increase for aviation gasoline, which is DOE's judgment of the most likely result from deregulation, the effect on the Gross National Product (GNP), as determined in Chapter V, will also be insignificant.

Views on the effects on competition. In Chapters III and IV, DOE examined the market structure for aviation gasoline and concludes that exemption of aviation gasoline from regulation will not adversely affect the competitive viability of independent refiners and marketers.

Views on the effects on small business. Marketing of aviation gasoline is not expected to change from present patterns as determined in Chapter IV. No change in supply or demand is projected. No significant price increase will result from exemption. An exemption, therefore, would not adversely affect small business. Large independent and small refiners increased their market share of aviation gasoline sales from 1.4 percent in 1972 to approximately 3.0 percent in 1978. These trends indicate the continued viability of the independent marketer.

Views on the effect on the supply and availability of energy resources for use as fuel or as feedstock for industry. Chapters III and IV examined the supply availability of aviation gasoline and demonstrated that supplies are adequate to meet present demand and anticipated demand for the period 1979-1980. This supply situation is not likely to change as a result of exemption, and, therefore, the fuel and feedstock needs of industry will continue to be met following exemption.

(5) Views on Unemployment, Consumer Price Index, and Gross National Product.

In the case of a proposed exemption from price regulations, the DOE must analyze the effects of such exemption on "...the rate of unemployment for the United States, the Consumer Price Index (CPI) for the

United States, and the implicit price deflator for the Gross National Product..." [Section 12(d)(2)(B) of the EPAA].

As explained in Chapter V, the potential impact of exemption of aviation gasoline on the rate of unemployments, the CPI and the implicit GNP price deflator will be negligible.

SUMMARY OF FINDINGS AND CONCLUSIONS

The DOE has presented the conclusions of this report and related them to the specific provisions of Section 12 of the EPAA, which details the findings and views which must be made to exempt a refined petroleum product from DOE allocation and price regulations. On the basis of the conclusions reached in this report, the DOE believes exemption of aviation gasoline from regulations at this time is fully consistent both with the data supporting the adequacy of supply of aviation gasoline and with the DOE's responsibilities as specified in the EPAA, the EPCA, and the ECPA.

The DOE believes there are substantial benefits to be derived from exempting aviation gasoline from controls. Because the regulations would no longer control conditions in the marketing and distribution of aviation gasoline, the inefficiencies associated with complying with the regulations and the unnecessary interference with market mechanisms would be eliminated. By eliminating uncertainties about the DOE's future regulatory policy, deregulation will also contribute to the likelihood of adequate future supplies of aviation gasoline, because refiners will be more likely to make the necessary capital investment in production capacity when they are able to have more confidence in their economic forecasts regarding return on investment.

Following are further specific beneficial aspects associated with an exemption of aviation gasoline from regulatory controls:

- o Deregulation will also help suppliers and marketers of aviation gasoline to better serve the requirements of small business and the marketplace will be more responsive to the needs of all individuals and companies, especially with respect to servicing the needs of consumers in marginal marketing areas.
- o The substantial administrative burdens and personnel administrative costs associated with compliance with the regulations will be abolished, and reporting requirements of the current control program will be reduced with deregulation thus moderating the attendant burdens on both the public and private sectors.