

Oil Industry Mergers: Structural Impacts and Antitrust Merger Guidelines

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Abstract

Oil industry mergers and consolidations of recent years have included some of the largest firms in the US oil industry. Cost and efficiency pressures have also led many firms, both merging and non-merging, to close, consolidate or sell many production, refining and marketing assets and to consolidate exploration and production programs worldwide. This paper examines the effects of recent mergers on US oil industry structure using the 1982 Justice Department merger guidelines to exemplify the types of factors antitrust authorities may have considered in permitting mergers to play a large role in the oil industry restructuring of the 1980's.

Introduction

Firms and industries can be restructured by many means including entry, exit, mergers sales/purchases of particular assets or ownership interests, consolidations and layoffs. All have been used by the oil industry during the 1980's but mergers played a big role from 1982 to 1985 perhaps due to changing stock market values relative to the value of reserves in the ground and different expectations regarding finding costs and OPEC's ability to maintain prices.

The numerous oil industry mergers and consolidations of 1983 to 1985 included some of the largest firms in the US oil industry. Cost and efficiency pressures led many firms, both merging and non-merging, to close, consolidate or sell many production, refining and marketing assets. In addition, many merging companies have sold refining and marketing assets to ensure Department of Justice (DOJ) acquiescence to the proposed merger. Exploration and production programs worldwide have also been affected by mergers, by foreign purchases of US oil industry assets/ownership interests and by efficiency efforts. This paper will examine the effects of the 1983 to 1985 oil industry merger wave on US oil industry

structure using the 1982 Justice Department merger guidelines to exemplify the types of factors antitrust authorities may have considered in permitting mergers to play a large role in the oil industry restructuring of the 1980's.

Ideally, this assessment of the domestic industry would include domestic industry structure in exploration, production, transportation (crude and product pipelines), refining and marketing. This paper will exclude exploration since the Department of Interior has limited joint participation (except for high cost areas) among majors in lease bidding consortiums since the late 1970s. Crude pipelines and product pipelines will be excluded since the Justice Department has recently recommended deregulation of all existing crude pipelines except TAPS and of all but five to eleven product pipelines.¹ Marketing of refined products will be excluded because the highly regional nature of these markets is beyond a preliminary study of this type and has recently been examined elsewhere.²

The focus of this study will be limited to the effects of recent mergers on the structure of domestic oil production and refining. Before

turning to this topic, the 1982 Justice Department merger guidelines and the 1984 revisions will be briefly reviewed.

Merger Guidelines

The 1980's represent a sea change in domestic markets due to increased international competition. One US response to this change has been a loosening of antitrust controls on US firms particularly those meeting significant foreign competition. This loosening has included antitrust controls on joint ventures, on patent/know-how/technology licenses, and on mergers. The new 1982 merger guidelines, for example, rendered obsolete the old-fashioned US antitrust policy toward structure.

The 1982 merger guidelines define anticompetitive mergers as those giving the merger partners the power to increase price above existing or likely future levels.³ The product and geographic market are defined by observing the probable responses by buyers (alternative products and suppliers) and suppliers (new, expanded or converted facilities) to a hypothesized price increase. The Herfindahl index is the relevant measure of concentration and is computed as the summation of the squared market share of each firm. This index varies from zero (pure competitive) to 10,000 (pure monopoly).

The merger guidelines indicate that the Justice Department will probably not challenge a merger of competitors even in highly concentrated markets when:

- * the post-merger Herfindahl index measures below 1000
- * the post-merger Herfindahl index is between 1000 and 1800 but the merger produces an increase in the index of less than 100 points
- * the post-merger Herfindahl index exceeds 1800 and the merger produces an increase in the index greater than 50 points but entry conditions and other factors indicate that the post-merger market will behave

more competitively than the pre-merger market.

The Herfindahl index values of 1000 and 1800 translate empirically into four firm concentration levels of 50 percent and 70 percent respectively and represent critical levels at which industry structure is empirically related to industry behavior/performance in terms of prices or profits.⁴

In its simplest form, the merger guidelines:

*pose four questions, each to be answered affirmatively before a horizontal merger will be challenged by the Department: (1) if there were only one present and future seller of a product in an area, would it be able profitably to increase its price; (2) is it likely that present competitors would be able to coordinate their activities and act monopolistically; (3) would the merger significantly increase the likelihood of such coordinated conduct; and (4) would such monopolistic conduct profitably persist despite the possibility of new entry?*⁵

Markets must be defined in terms of products and geography before the Herfindahl index guidelines can be brought to bear on questions 2, 3 and 4 above. Two product groups will be used for this paper -- crude oil and refined products. Imports of crude and refined products offer significant price competition for domestic products but will be excluded from explicit Herfindahl index calculations since these imports can be readily expanded and the resulting "domestic only" Herfindahl calculation can be regarded as an upper bound on the actual antitrust market Herfindahl.

Delineation of the appropriate antitrust geographic market for refined products could begin with the local market around each refinery but several factors suggest that a detailed micro-level analysis of this type is not needed. First, the bulk of US refining capacity is located in 4 major refining centers: Chicago, Los Angeles, Philadelphia and the US Gulf coast including the State of Texas. Second, the FTC has recently recognized⁶

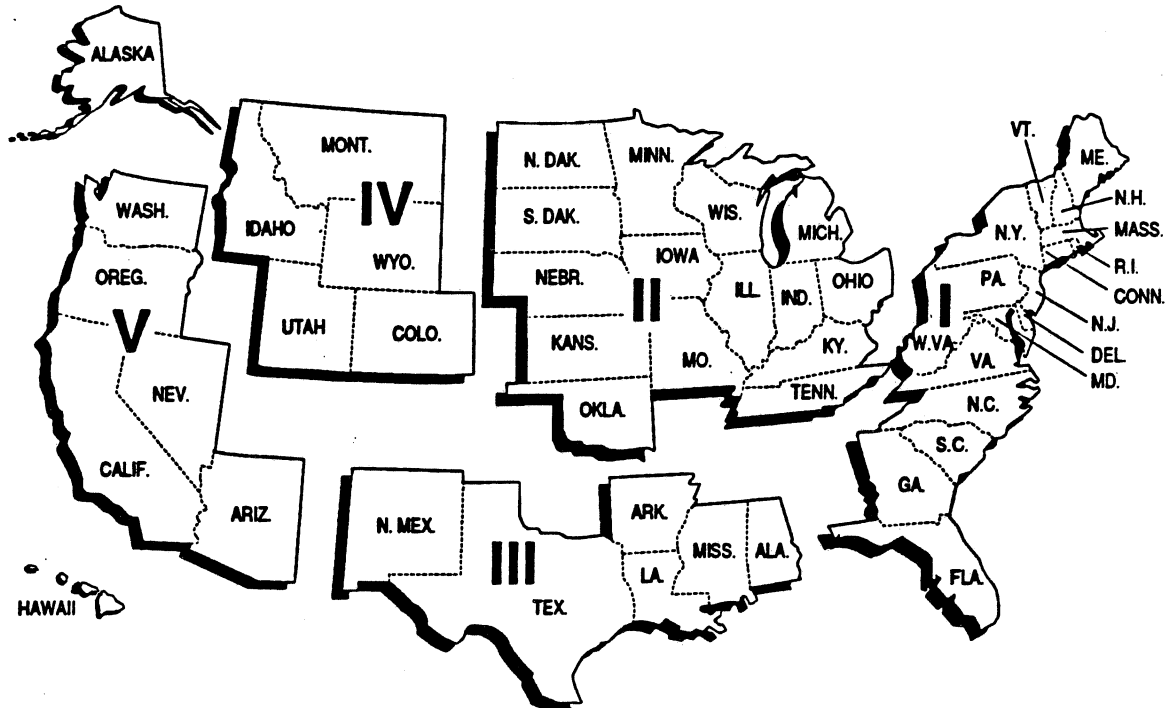
that the ease of moving refined products among these centers and regions quickly moderates regional price differences and that entry in refining is not blocked although capacity expansions are typically undertaken by existing firms rather than de novo entrants. Finally, imports of refined products have been running at about 10Z of US consumption and these imports serve as an additional force moderating any inter or intra regional price differences. These factors suggest that refining is probably a national market but some scrutiny of regional markets should be considered. This study will utilize Petroleum Administration for Defense District (PADD) 1 to 5 as regional refining markets (see Figure 1). The

potential for mergers to adversely affect regions smaller than PADDs will be noted when specific mergers are discussed later.

Turning to the appropriate antitrust market for crude petroleum, the fact that refined product regional price differences are quickly moderated by refined product shipments suggests that regional crude price differences would be moderated as well. Indeed the ready availability of imported crude (currently running over 30Z of US production plus imports) suggests that crude production is probably a national market. Again, however, some scrutiny of regional markets should be considered. A recent Federal Trade Commission

Figure 1

Petroleum Administration for Defense (PAD) Districts



Source: Energy Information Administration, Petroleum Supply Annual Report, 1988, Volume 1, p. 116.

(F.T.C.) study⁷ of the oil industry concluded that Alaskan North Slope crude may be a relevant product submarket and that PADD V⁸ may be a relevant geographic submarket for crude production. Since these are the only crude oil submarkets identified in recent government studies, available data will be used to calculate the Herfindahl index for each submarket.

For crude oil and natural gas production, market share data by company are readily available for the largest 400 publicly owned firms.⁹ These data will support market share and Herfindahl index calculations as long as the market is defined as US crude oil production or US gas production. Market share data for the North Slope and PADD V are available by company from Alaskan and California agencies.¹⁰

For oil refining, refining capacity data by firm and by state are readily available for all refineries.¹¹ These data will support market share and Herfindahl calculations for geographic areas composed of states as long as the product market is defined as all refined products and one assumes that all refineries are equally utilized. Since utilization of refinery capacity is fairly similar for all refineries, this assumption is appropriate.¹²

Use of Market Share Data to Approximate the Herfindahl Index at the National Level

The *Oil & Gas Journal* publishes, each year, data on the top 400 domestic oil firms whose shares are publicly traded. Market shares can be computed from these data. The largest privately held firms (Koch and Clark Oil) are not included in this listing but available information indicates that the market share of U.S. production or refining for each firm is less than one percent.

US oil and gas production and refining Herfindahl indices are shown in Table 1. These indices indicate a very low level of concentration for both US oil and gas production--331 or less for oil, 130 or less for gas, and 471 less for refining. The modest increase in the refining Herfindahl since 1981 reflects the closing of small inefficient re-

fineries once subsidies for them were terminated by the Reagan administration.

Use of Market Share Data to Approximate the Herfindahl Index at Regional Levels

Oil production in PADD V is dominated by Alaskan North Slope and California production with Arizona, Nevada, Oregon, Washington and Hawaii having less than 0.001 percent of total PADD V production. Sohio, Arco and Exxon produce nearly 90% of North Slope crude as operators hence the North Slope Herfindahl index for 1984 is a relatively high 2,797 (Table 2). The crude production Herfindahl index for PADD V is a much more modest 1,180, however (Table 2).¹³

Alaska has very little refining capacity and North Slope crude is shipped to both California (PADD V) and the U.S. Gulf (PADD III) for refining. The more modest Herfindahl for PADD V crude production (1,180) combined with the PADD III and PADD V refining Herfindahls of 518 and 1,117 respectively (Table 3) suggest that the North Slope crude production Herfindahl of 2,797 is not a problem. Indeed, any attempt by North Slope producers to raise delivered California prices above world price levels would be frustrated by an increase of crude imports into California. FTC concerns¹⁴ (that the price of North Slope crude net of transportation cost, sold in the U.S. Gulf is significantly below the net price for North Slope crude sold in California and that this is indicative of price discrimination/market power) are unfounded. Producers in many industries must frequently absorb freight when nearby markets for a product are saturated and the product must be moved to more distant markets at a lower net price. In addition, competition from Venezuelan heavy crudes may depress US Gulf (PADD III) prices for Alaskan North Slope crude.

Refining Herfindahls for each PADD have been computed using 1982 data (Table 3). The results indicate Herfindahls of 865, 629, 518, 909 and 1,117 for PADD's I to V respectively. The U.S.

TABLE 1

U.S. Oil and Gas Production and Refining Capacity Herfindahl Index

	U.S. Production		U.S. Refining Capacity
	Gas	Liquids	
1982	130	331	412
1984	128	328	471

Source: Author's calculations based on data in Oil and Gas Journal, and Gas Facts, 1985

TABLE 2

1984 North Slope and PADD V Crude Oil Production Herfindahl Index

North Slope	2,797
PADD V	1,180

Source: Author's calculations based on data from: Annual Review of California Oil & Gas Production, Conservation Committee of California Oil Producers, Los Angeles, 1982 to 1986; and Alaska Oil & Gas Conservation Commission and Alaska Department of Natural Resources.

TABLE 3

1982 Refining Capacity Herfindahl Index By PADD
(Petroleum Administration for Defense District)

	PADD 1	PADD 2	PADD 3	PADD 4	PADD 5
Total PADD Capacity (Barrels/Day)	1,468,950	3,501,177	7,454,761	560,990	3,173,783
Herfindahl Index	865	629	518	909	1,117

Source: Author's calculations based on data in: Oil & Gas Journal, "Annual Refining Survey," March 21, 1983, Page 128-153

refining Herfindahl for 1982 was 412 (Table 1) hence U.S. refining is more concentrated regionally. The U.S. refining Herfindahl increased about 20% between 1982 and 1985. If regional Herfindahls have also increased 20% since 1982, only PADD's II and III would have Herfindahls below 1000 but the other three would remain well below 1800.

1983-1985 Mergers and Justice Department Merger Guidelines

Table 4 summarizes oil industry mergers from 1983 to 1985 ranked in order of size. The largest merger is the Chevron/Gulf merger of 1985 and Table 4 shows the market share of each firm prior to merger for production (both gas and oil) and refining. Note also that the purchasing firm is listed to the left of the slash mark and the purchased firm to the right of the slash mark. In general, oil industry mergers became progressively larger between 1983 and 1985.

Returning to Table 1, one finds that the Herfindahl indices for US gas production, US oil production and US refining capacity were all well below 1000 during the years the mergers took place. Based on this, all of the mergers would satisfy the merger guidelines for these industry segments since the post merger Herfindahl index remained well below 1000. Even if the index exceeded 1000, the last three columns of Table 4 indicate that none of the mergers (excluding the refining impact of the massive Chevron/Gulf merger) increased the Herfindahl index in these three industry segments by more than 50 points. Even the refining impact of the Chevron/Gulf merger was less than 100 points at the national level.

The regional market structure impacts of the Chevron/Gulf and Texaco/Getty mergers are summarized in Table 5. Neither merger had any impact on the relatively high North Slope crude production Herfindahl of 2,797 and the PADD V crude production Herfindahl of 1,180 increased only 5.6 and 12.8 respectively due to the mergers. Turning to regional refining markets, the mergers had no impact on PADD IV market structure,

virtually no effect on PADD II market structure, and were well within the merger guidelines for both PADD III and PADD V. In refining PADD I, the mergers fell within the merger guidelines but did result in a post merger Herfindahl in excess of 1,000.

Overall, the structure effects of these two large mergers were: negligible on regional crude production plus PADD II and PADD IV refining; modest but well within merger guidelines in PADD III and PADD V refining; and more pronounced but well within merger guidelines in PADD I refining. These increases in regional refining concentration should present no major problems since even the FTC recognizes that the ease of moving refined product among regions quickly moderates regional price differences and that entry into refining is not blocked although capacity expansions are typically undertaken by existing firms rather than *de novo* entrants (See footnote 6). FTC concerns about local increases in refining concentrations have been expressed only on a merger by merger basis as noted below.

Industry segments not covered by the data include exploration, pipelines and marketing. Concentration in US exploration is known to be relatively modest and the Department of Interior has limited joint participation of majors in lease bidding consortiums except for high cost areas. Based on lease revenue, the largest 200 companies drill 30% of all wells, 44% of footage and make 83% of drilling expenditures; the 20 largest companies find 60% of the large fields and 20% of the small ones.¹⁵

As noted in Section I, the Justice Department has recommended deregulation of all crude pipelines except TAPS and of all but five to eleven product pipelines. In addition, regulation of crude and product pipelines remains in place to counter any potential negative effects of these mergers hence no violation of the merger guidelines by recent mergers is indicated.

Turning finally to marketing, imports of refined products and crude oil offer significant compe-

TABLE 4
Summary of Recent Oil Industry Merger
and Their Impact on US Market Structure

Merging Companies	Year of Merger	Percent of		Percent of		Percent of		Total Increase in Herfindah Index		
		U.S. Liquids Prior to Merger	U.S. Gas Prior to Merger	U.S. Liquids Prior to Merger	U.S. Gas Prior to Merger	U.S. Refining Prior to Merger	U.S. Liquids	U.S. Gas	U.S. Refining	
1. Chevron/Gulf	1985	3.83/3.29	2.26/2.80	8.75/5.25	25.2	12.7	92.0			
2. Texaco/Getty	1985	4.02/3.23	4.15/1.70	5.58/1.67	26.0	14.1	18.6			
3. Mobil/Superior	1984	3.26/0.66	3.24/1.43	5.06/NA	4.4	9.3	NA			
4. Occidental/Cities	1984	1.60/NA	0.22/NA	NA/1.91	--	--	--			
5. Sun/Exeter	1983	2.47/0.0061	1.71/.00023	2.13/NA	0.03	8x10 ⁻⁴	--			
6. Phillips/General American	1983	1.58/0.22	1.46/0.22	1.75/NA	0.69	0.65	--			
7. Diamond Shamrock/Natomas	1983	0.12/0.04	0.53/0.12	--	9x10 ⁻³	0.13	--			
8. Williams Gas/Northwest Energy	1983	0.04/0.006	0.06/0.17	--	5x10 ⁻⁴	0.02	--			
9. Pacific Lighting/Farmland Ind.	1983	0.00168/0.12	0.00963/0.09	--	4x10 ⁻⁴	1.8x10 ⁻³	--			
10. Minden Oil & Gas/Centura Energy	1983	0.00003/0.002	0.00014/0.005	--	3x10 ⁻⁶	1.5x10 ⁻⁶	--			
11. Inter North/Belco Pet.	1983	0.02024/0.05	0.13227/0.13	--	2x10 ⁻³	0.034	--			
12. Kee Exploration/Acadia Pet.	1983	0.00034/3.2x10 ⁻⁷	0.00005/5x10 ⁻⁸	--	2x10 ⁻⁵	5x10 ⁻¹⁰	--			
13. Kanab Services/Noran Energy	1983	NA	NA	--	--	--	--			

NA means not available

Data Source: "Restructuring Changes the Top 400 Domestic", *International Petroleum Encyclopedia*, Penwell, 1986, pp. 363-367; and authors' calculations.

TABLE 5

Summary of Major Oil Industry Mergers and
Their Impact on US Regional Market Structure

<u>Regional Market</u>	<u>Merging Companies</u>	
	<u>Chevron/Gulf (1985)</u>	<u>Texaco/Getty (1985)</u>
<u>1984 North Slope</u>		
<u>Crude Production:</u>		
Pre Merger Herfindahl	2,797	2,797
Market Shares	0.7/0	0/0.5
Change in Herfindahl	0	0
<u>1984 PADD V</u>		
<u>Crude Production:</u>		
Pre Merger Herfindahl	1,180	1,180
Market Shares	5.7/0.5	1.2/5.3
Change in Herfindahl	5.6	12.8
<u>1982 PADD I Refining:</u>		
Pre Merger Herfindahl	865	865
Market Shares	11.4/11.9	6.1/9.5
Change in Herfindahl	271.3	115.9
<u>1982 PADD II Refining:</u>		
Pre Merger Herfindahl	629	629
Market Shares	0/1.2	2.4/2.3
Change in Herfindahl	0	11.0
<u>1982 PADD III Refining:</u>		
Pre Merger Herfindahl	518	518
Market Shares	4.8/8.2	8.2/0
Change in Herfindahl	78.8	0
<u>1982 PADD IV Refining:</u>		
Pre Merger Herfindahl	909	909
Market Shares	8.0/0	0/0
Change in Herfindahl	0	0
<u>1982 PADD V Refining:</u>		
Pre Merger Herfindahl	1,117	1,117
Market Shares	27.9/1.6	4.8/1.9
Change in Herfindahl	89.3	18.3

Source: Author's calculations.

tition for US producers. The geographic nature of petroleum product markets makes analysis difficult. The Justice Department has paid careful attention to marketing in oil mergers because some local and regional product markets can become more concentrated than national data would indicate. While the Justice Department and the FTC have not formally challenged any of the recent oil mergers, their reviews have prompted several merging firms to dispose of service station and refining assets to ensure Justice Department/FTC approval of the merger. For example, Gulf sold many of its service stations to Texaco to ensure government approval of its merger with Chevron. In addition, Justice Department/FTC decisions to seek preliminary injunctions have resulted in abandonment of proposed oil industry mergers.

For example, the FTC sought preliminary injunctions against both the Mobil/Marathon merger and the Gulf/Cities Service merger due to local/regional marketing impacts and both mergers were abandoned. A major factor in the FTC's opposition to the Mobil/Marathon merger was concern that Mobil would discontinue Marathon's policy of supplying independent marketers.¹⁶

Conclusions

While composed of very large firms by most standards of comparison, the oil industry is and for many years has been less concentrated than the all manufacturing industry average in the United States as measured by four-firm concentration ratios. While a variety of efficiency, asset val

uation and other theories have been used to explain oil and other industry mergers,¹⁷ the strength of the current merger guidelines is that a relatively unconcentrated and reasonably competitive industry has been free to use mergers as one of many means available to restructure itself. Such freedom did not exist ten years ago before the current government philosophy of allowing mergers unlikely to raise consumer prices was adopted.¹⁸ Given the massive government intervention in the oil industry over the past thirty years in the form of import quotas, price controls, entitlement programs, and subsidies for small refineries and the massive expansion/contraction since 1974, restructuring is probably inevitable.

Examination of national and regional oil industry data indicates that regional markets are more concentrated but even the massive Chevron/Gulf and Texaco/Getty merger impacts were well within the merger guidelines. The FTC has opposed a statutory ban on oil industry mergers because of this and because of the remaining opportunities for oil mergers to improve efficiency.¹⁹ Indeed, the current merger guidelines would appear to allow additional room for continued restructuring using mergers assuming that local and regional product markets are not severely affected. The fact that no major oil industry mergers have occurred since 1985 reflects management choice among many restructuring options rather than any change in US merger policy.

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Footnotes

- 1 U. S. Department of Justice, *Oil Pipeline Deregulation Report*, May 1986.
- 2 Recent studies include: M. Slade, "Exogeneity Test of Market Boundaries Applied to Petroleum Products," *Journal of Industrial Economics*, Vol. 34, No. 3, March 1986, 291-304; and P. Spiller and C. Huang, "On the Extent of the Market: Wholesale Gasoline in the Northeastern United States," *Journal of Industrial Economics*, Vol. 35, No. 2, December 1986, 1-3146.
- 3 L. White, "Antitrust and Merger Policy: A Review and Critique," *Journal of Economic Perspectives*, Vol. 1, No. 2, Fall 1987, p. 15.
- 4 *Ibid*, p. 17. Note that the higher profits observed for these "critical values" could be due to efficiency rather than market power.
- 5 G. White, "Market Delineation and the Justice Department's Merger Guidelines," *Duke Law Journal*, June 1983, p. 523. For additional discussion of the 1982 merger guidelines, see: E. Fox, "The New Merger Guidelines -- A Blueprint for Microeconomic Analysis," *Antitrust Bulletin*, Vol. 27, No. 3, Fall 1982, 519-591. Also, see the June 14, 1984 Justice Department revisions of these guidelines.

- 6 Mergers in the Petroleum Industry", Report of the Federal Trade Commission, September 1982, pages 183, 184, and 216.
- 7 "Mergers in the Petroleum Industry," Report of the Federal Trade Commission, September 1982, pages 151-152.
- 8 PADD V is the Petroleum Administration for Defense District consisting of Alaska, Arizona, California, Hawaii, Nevada, Oregon & Washington.
- 9 For oil and gas production and reserves by company, see: "Oil Gas Journal 400", *Oil and Gas Journal*, September issues since 1982.
- 10 Alaskan crude production by company is available from the Alaska Oil & Gas Conservation Commission and the Alaska Department of Natural Resources. California Crude production by company is available in the *Annual Review of California Oil & Gas Production*, Conservation Committee of California Oil Producers, Los Angeles.
- 11 For refining capacity by company by state, see: "Annual Refining Survey," *Oil and Gas Journal*, March issues since 1976.
- 12 For 1982 for example, PADD 1, 3 and 5 had only one refinery each with a capacity utilization rate below 90 percent and PADD 2 and 4 had none below 90 percent.
- 13 Note that these production data are compiled by operator hence a Herfindahl index computed using them is probably higher than on computed if production by ownership interest data were available.
- 14 "Mergers in the Petroleum Industry," Report to the FTC, pages 151-154.
- 15 R. Meyer and M. Fleming, "Role of Small Oil and Gas Fields in the United States," *Bulletin of the American Association of Petroleum Geologists*, Vol. 69, 1985 p. 1950.
- 16 "Mergers in the Petroleum Industry," Report to the FTC, September 1982, pages 7 and 294.
- 17 "Hands-Off Antitrust Policy Likely to End," *Wall Street Journal*, October 24, 1988, page B-1. Also, see: "Mergers in the Petroleum Industry," Report to the Federal Trade Commission, September 1982, pages 295-298.
- 18 *Ibid.*
- 19 *Ibid*, p.7.