Issues in the Deregulation of Oil Pipelines: An Empirical Analysis

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ABSTRACT

An overview of the issues involved in the deregulation of oil pipelines is presented. The most recent market structure and concentration data are reviewed, and, for the first time, a summary of the U.S. Department of Justice data is given in the Appendix.

The purpose of this paper is to present an overview and analysis of the major issues involved in the debate over the deregulation of oil pipelines. Recently, several bills for deregulation and regulatory reform have been introduced in Congress (HR.2677, S.1626). Moreover, the oil pipeline industry (1), the U.S. Department of Justice (DOJ), and the Federal Energy Regulatory Commission (FERC) have all suggested that oil pipelines be partly or fully deregulated. Although the courts have not accepted the regulatory procedures recently proposed by the FERC or those of its predecessor, the Interstate Commerce Commission (ICC), in 1982 they supported the vacation of the DOJ consent decree that had been entered in 1941 and provided for a constraint on dividends. At this juncture it is useful to review the evidence for and against oil pipeline deregulation. In the first section of this paper, the issue of whether oil pipelines are natural monopolies is examined. The second section is a review of the methods used in the three most recent studies on oil pipeline market structure. In the third section the results of these studies are compared. In the final section further qualifying factors are discussed and a conclusion is offered.

NATURAL MONOPOLY

An important question recently raised in debate about deregulation of oil pipelines is whether natural monopoly conditions exist in the industry. Although it has been established that economies of scale or cost subadditivity exist in oil pipelines due to the technological nature of production (2), there are factors that mitigate the import of these decreasing cost conditions. In particular, if the relevant market is identified as the corridor over which a pipeline extends, the dynamic conditions of market growth will tend to reduce the natural monopoly effects. For example, the initial pipeline constructed along a corridor might have had excess capacity in early years; however, in later years demand may substantially outgrow the initial pipeline's capacity so that construction of a new line or lines along the same corridor is mandated. If this new construction is by another firm, competition should prevail along the corridor. Second, because pipelines may face competition from other pipelines, from seaports, and from other rivals at each end of the line, the exercise of natural monopoly power may be mitigated. Indeed, the natural monopoly power of a pipeline may exist only insofar as the pipeline (a) has monopoly power at one end, (b) has monopoly power at the other end, (c) is large enough to carry all the traffic between both points, and (d) enjoys cost subadditivity conditions (i.e., a single pipeline can satisfy the demand along the corridor at a lower total cost than a larger number of pipelines). Only under these conditions will a single pipeline segment have a natural monopoly. Thus it appears unlikely that natural monopoly conditions exist in the oil pipeline industry.

MARKET STRUCTURE AND CONCENTRATION IN OIL PIPELINES

In this section an analysis of three recent studies of market concentration and competition in the oil pipeline industry is presented. These studies are (a) A Study of Oil Pipeline Competition by Mitchell (unpublished study), (b) Competition in Oil Pipeline Markets by Anderson and Rapp of the National Economic Research Associates (NERA) (3), and (c) Competition in the Oil Pipeline Industry: A Preliminary Report by the Antitrust Division of the U.S. Department of Justice (hereafter referred to as the DOJ study) (4). Before examining the actual results of these studies, it is necessary to examine the market definitions, rivalries, and measures of market concentration used in each study.

All three studies focused on the origin-destination market definition rather than the corridor definition, although NERA believed that the corridor definition of a market still had some merit. The origin-destination market definition examines the market structure at each end of the pipeline, whereas the corridor definition considers only those modes that run along the same corridor to be rivals. All three studies considered only petroleum-based commodities that can be transported via pipelines. These included gasoline, jet fuel, kerosene, diesel fuel, and distillate heating oil. Table 1 gives a comparison of oil pipeline markets used in each of the three studies examined here. As can be seen from this table, Mitchell used producing areas, refining centers, and standard metropolitan statistical areas. NERA used producing areas, refining centers, and BEAs (the 183 geographic markets in the lower 48 states established by the U.S. Department of Commerce, Bureau of Economic Analysis), and the DOJ consistently used BEAs for all markets. The relative narrowness of market definitions will have a significant influence on the level of concentration found in a particular market. As both the DOJ study and Mitchell study point out, using a BEA may understate competition (e.g., if the densely populated areas of

TABLE 1 Oil Pipeline Markets Used in Various Studies

	Mitchell	NERA	DOJ
Crude origin	27 producing areas	50 largest oil fields[a]	61 BEAs[b]
Crude destination	48 refining centers	42 refining centers	65 BEAs[c]
Product origin	48 refining centers	44 refining centers	50 BEAs[d]
Product destination	59 standard metropolitan statistical areas	50 BEAs[e]	115 BEAs[f]

[a]NERA used a random sample of 182 large oil fields.
[b]Only 61 of the 183 BEAs had crude pipeline origins.
[c]Only 65 BEAs had crude pipelines in destination markets.
[d]Only 50 of 183 BEAs had pipelines in product origin markets.
[e]NERA used a random sample of 183 BEAs.
[f]Only 115 of 183 BEAs had product pipeline delivery.

a highly concentrated BEA are in close proximity to facilities in another highly competitive BEA, the concentration of the former BEA will be overestimated).

Another important consideration in the determination of concentration of economic power is the handling of joint ventures and undivided interest pipelines. NERA combines two or more pipelines as a single rival if they have any owners in common. In the DOJ and Mitchell studies, if no member of the joint venture line owns more than 50 percent of the pipeline, it is treated as a single independent rival, irrespective of whether its owners also own a competing pipeline in the market.

Because these studies have chosen to use an origin-destination definition of markets rather than a corridor definition, four categories of markets must be studied: (a) crude origin (collection), (b) crude destination (delivery), (c) product origin (collection), and (d) product destination (delivery). Therefore another difference among the three studies concerns the delineation of the relevant rivals in terms of intermodal competition in each of these four market categories.

In the crude collection market, NERA and the DOJ raw data included trunk pipelines, local refineries, and barges and tankers as relevant rivals, and Mitchell added trucks.

In the crude delivery market, NERA and the DOJ included trunk pipelines, local crude producers, and barges and tankers, and Mitchell added trucks, pipelines within the refinery market, and volumes of crude shipped by water, not measured by NERA.

In the product collection market, NERA and the DOJ raw data used trunk pipelines, local consumption, and barges and tankers.

Finally, in product delivery, NERA and DOJ included trunk pipelines, local refineries, and barges and tankers. Again, Mitchell added trucks to this list.

Therefore, overall, the NERA study and the raw data of the DOJ study place less emphasis on the role of truck and water competition than does the Mitchell study. Indeed, the DOJ study (4,p.17) states:

> Most shipments via railroad and trucks are intra-market shipments, whose volumes have already been accounted for by the inter-market pipeline or water transportation or by local production or consumption activity. Thus, rail and truck facilities are excluded from the analysis of relevant competitors.

For measures of concentration, the Mitchell study examines the number and market power of rivals in each market. NERA and the DOJ used the Herfindahl index to measure concentration in each market. In general, for both these studies, a Herfindahl index greater than 2,500 was suggestive of a concentrated market that therefore was classified as a high risk market, which may need regulation. Moreover, NERA had several categories of risk. For example, markets with Herfindahl indexes of 0 to 2,500, 2,500 to 5,000, and 5,000 to 10,000 were considered low, medium, and high risk markets, respectively. In addition, NERA provided for further subclassification depending on the extent of water competition in the crude origin, crude collection, and product delivery markets and the size of local consumption in the product collection market.

Because two of the three studies examined used the Herfindahl index, a brief description of this index is appropriate. In June 1982 the Antitrust Division of the Department of Justice announced that in antitrust cases they would use the Herfindahl index to measure market power. The Herfindahl index is defined as

$$HI = \sum_{i=1}^{n} S_i^2$$

where n is the number of firms in the industry and S_i is the market share of the ith firm (i = 1 . . . n). That is to say, the Herfindahl index (HI) is calculated by summing the square of each firm's market share as measured by throughput capacity. Consider a hypothetical pipeline market with four firms such that their market shares are as follows:

Firm No.	Market Share (%)	Market Share Squared
1	10	100
2	35	1,225
3	5	25
4	50	2,500
	HI =	3,850

As can be seen in this particular market, the squared market shares of each firm sum to 3,850. Thus the DOJ would consider this a high risk or concentrated market, whereas NERA would consider it a moderate risk market. The Herfindahl index technically has a maximum of 10,000 and a minimum close to zero and is thought to have numerous advantages over other measures of market concentration.

These differences account for some of the deviations in the conclusions of the various studies, but, as will be seen, there are additional differences noted by Mitchell and the DOJ study (although not accounted for in the DOJ preliminary report). Before examining these other qualifying features, let us turn to an examination of the results of these three studies on market concentration.

RESULTS OF MARKET STRUCTURE AND COMPETITION STUDIES

In this section is presented a summary of the results of the three most recent market concentration studies, those by Mitchell, NERA, and the Department of Justice. It should be noted, however, that in summarizing the DOJ study, the 2,500 Herfindahl index level is used as a cutoff point (i.e., if a BEA in the DOJ study had a Herfindahl index greater than 2,500, it was automatically placed in a high risk category). As will be noted, the DOJ study and others have recognized the many limitations in such a simple application of this arbitrary rule. The DOJ intends to examine each market more fully for qualifying features.

Results of Studies on Competition in the Crude Origin or Collection Market

Mitchell's findings indicated that the crude collection market was sufficiently competitive. He found for 27 producing areas that local refinery capacity was large relative to crude production in 20 of the 27 areas, and that refinery capacity exceeded production in 14 of the 27 producing centers. In only three cases was a market served by a single pipeline. Examining each of these three cases in detail, Mitchell indicates that sufficient competition exists.

The NERA study of 50 crude collection markets, on the other hand, found seven high risk markets, 26 moderate risk markets, and only 17 low risk markets. Thus, using the DOJ threshold, the NERA study implies that 33 of 50 crude collection markets should be regulated.

Similarly, the DOJ data indicated that 46 of 61 crude collection markets in which pipeline transportation was available were high risk markets. Thus, on the basis of the NERA and DOJ statistics, it appears that most of the crude markets are uncompetitive, whereas the Mitchell study indicates that competition is sufficient and that deregulation is an appropriate strategy for these markets.

Results of Studies on Competition in the Crude Delivery (or destination) Markets

In these markets, Mitchell found that of the 48 refining centers, only 11 were served by a single crude pipeline. In studying each of these 11 centers in more detail, Mitchell argues for a variety of reasons that these markets are still competitive.

The NERA study of 42 crude delivery markets finds that 15 are in the high risk category, 15 in the medium risk, and only 12 in the low risk category. However, when NERA adjusted these data by assuming that a refinery center located on a seaport should be considered in the low risk class regardless of the number of pipelines serving the market, they concluded that almost two-thirds of refinery centers were located in the low risk category, leaving only one-third in the high risk category. In sum, NERA concluded that crude delivery was a most competitive market except for refineries in the inland market.

Finally, the DOJ study found 42 high risk and 23 low risk markets or 58 percent of crude delivery markets to be high risk.

Results of Studies on Competition in the Product Origin or Collection Markets

Mitchell finds 13 refining centers in which only a single pipeline collects product. Examining these in detail, he states that in three centers exploitation is not a problem because perfect vertical integration exists. In the remaining 10 refinery centers, Mitchell lists circumstances such as the existence of vertical integration, water competition, local consumption that is larger than refinery capacity, and pipeline collection that represents a small percentage of capacity as factors that would tend to eliminate exploitation. Thus he concluded that product collection markets are, for the most part, competitive.

In contradistinction, NERA found this function to be most uncompetitive. Thirty-three of 44 markets were found by NERA to be in the high risk category. Therefore NERA concluded that 85 percent of national refinery capacity falls within the medium to high risk category, and only 15 percent of capacity--mainly situated near major consuming centers--is unlikely to be subject to the risk of monopoly increases in product pipeline transportation rates if regulation is removed. In contrast, the DOJ data indicated that only 25 of the 50 BEA markets examined fell into the high risk category.

Results of Studies on Competition in the Product Delivery (destination) Markets

The analysis by Mitchell in the product delivery markets finds these markets to be competitive. He states that markets serviced by product pipelines typically have about five competing local entities, and, in addition, potential or actual water competition exists in about 80 percent of the markets. Finally, Mitchell argues that, because by any measure the refinery industry is competitive, this implies that product pipelines are competitive in destination markets. Nine of what he considers the 14 "worst" cases served by a single product pipeline have significant water competition. Mitchell also found instances of potential or actual competition in the remaining markets such as nearness of ports (Flint), large numbers of local refineries (Salt Lake City), high potential for entry (Phoenix), and state regulation that held pipeline rates too low and eliminated water competition (San Diego).

In contrast to Mitchell, NERA found most product destination markets uncompetitive. Of the 50 markets examined, NERA found 17 high risk, 29 medium risk, and four low risk markets. Using the DOJ standard, the NERA study would indicate that 46 percent of the 50 markets were high risk.

The DOJ study used two types of Herfindahl indexes in its product destination market analysis, one unadjusted for surplus capacity and a second adjusted for surplus capacity. Using the unadjusted Herfindahl index as a threshold, DOJ data indicate that 99 of 115 product destination markets fall into the high risk category, thus indicating a markedly uncompetitive environment. When adjusted for surplus capacity, the high risk markets drop to 85. Thus, whether adjusted or unadjusted, the DOJ raw data place a high proportion of product destination pipelines in the high risk category.

Table 2 gives a rough summary of the conclusions of each study. In general, the NERA study conflicts with Mitchell in all but the crude destination markets and seems to be in agreement with the DOJ data in most markets.

TABLE 2 Summary of Competition Studies

	Mitchell	NERA	DOJ
Crude origin	Low risk	High risk	High risk
Crude destination	Low risk	Low risk	Moderate to high risk
Product origin	Low risk	High risk	Moderate to high risk
Product destination	Low risk	High risk	High risk

Reasons for the differences in these studies are numerous, but one significant point is that the DOJ data reported here were interpreted in a mechanical manner. The DOJ itself has advised that numerous other factors should be examined on a market-by-market basis and that a perfunctory examination of these statistics is misleading. Incorporating these other factors will bring the DOJ results much closer to the Mitchell results.

Although several reasons for the divergent results of these studies have previously been discussed, it is imperative to examine other character-

istics, suggested by both Mitchell and the DOJ, that could alter substantially the interpretation of the DOJ raw data.

QUALIFYING FACTORS RECOGNIZED BY BOTH MITCHELL AND DOJ

Both Mitchell (unpublished study, October 1983) and the DOJ (4) have argued that a high degree of concentration, as measured by the Herfindahl index, does not necessarily indicate market power. Moreover, DOJ also recognizes that even where market power exists this does not necessarily indicate regulation. The DOJ tends to favor a cost-benefit approach to regulation. For example, if vertical integration conditions exist such that market power could be wielded by the firm whether it were regulated or not, the DOJ would suggest leaving the market unregulated. Among other factors that would mitigate or alter the DOJ statistics would be a situation in which a pipeline had a small market share in an area that had a high degree of competition or one in which the proximity to facilities in other BEAs increased potential or actual competition. The DOJ also recognized surplus capacity in a market as a mitigating factor. As has been mentioned, the DOJ data only recognized this in the product destination markets. Moreover, where ease of entry exists in ports or places where water traffic could be readily expanded, the DOJ would again make allowances. For these factors that qualify market power, the DOJ data can be readily examined for only the smallness of pipeline market shares. A rough examination of these data indicates that relatively few markets that are highly concentrated would be affected by this qualification. In terms of the remaining factors, a detailed examination of each market, along the lines followed by Mitchell, needs to be performed.

In addition to these factors that qualify market power, the DOJ study and Mitchell, to some extent, have recognized that vertical integration and refinery concentration may place sufficient constraints on markets, which would render regulation either ineffective or unnecessary. For example, a monopoly crude line delivering to its own refinery in an area where the refinery faces no competition would render pipeline regulation ineffective, because a low rate for transportation could be compensated for by a high refinery rate and possibly low crude price if the pipeline in addition had monopoly power. The DOJ study provides several other hypothetical examples where vertical integration renders pipeline regulation either ineffective or unnecessary (4). In addition, the DOJ also recognizes the concept of countervailing power between refineries and pipelines that results in a bilateral monopoly equilibrium (5,p.272). The DOJ lists several such examples (4,p.48):

> Accordingly, if one or more refineries form a bottleneck that is no less concentrated than the product pipelines transporting product from the refineries, then the Department will designate the product origin market as non-high-risk for the product pipelines in the market. Furthermore, if the refinery bottleneck is no less concentrated than a product pipeline corridor connecting the refineries to a separate product destination market, then the Department will designate the product destination market as non-high-risk for the product pipelines in the corridor. By the same token, if the refinery bottleneck is no less concentrated than the crude pipelines transporting crude to the refineries, then the Department will designate the crude destination market as non-high-risk for the crude pipelines in the market. Finally, if the refinery bottleneck is no less concentrated than a crude pipeline corridor connecting a separate crude origin market to the refineries, the Department will designate the crude origin market as non-high-risk for the crude pipelines in the corridor.

Thus both DOJ and Mitchell provide for numerous qualifications. Whereas Mitchell does this by his detailed analysis of "worst" cases, DOJ provides room for more investigation.

In summary, the Mitchell and DOJ studies were strongly on the side of deregulation. For example, Mitchell (1983 study, p. 86) concludes:

> Considering the large number of markets we have examined, and that these were ostensibly the "worst" cases, our findings suggest that the opportunity for oil pipelines to exercise monopoly power must be rare.

The DOJ states in the introduction (4,p.2):

> It is nonetheless evident from an application of the methodology described in the report to the market data presented in the appendix that most interstate pipelines should not be regulated. The department recommends that such pipelines be deregulated as soon as practicable: thus, deregulation may well provide significant savings in regulatory costs for society.

However, NERA (3,p.14) is at odds with these conclusions:

> In conclusion, competition is ineffective in many oil pipeline markets. In the absence of regulation, many, if not most, oil pipelines would have substantial market power and would be able to charge high rates and earn substantial monopoly profits.

Thus Mitchell and DOJ agree that oil pipeline markets are sufficiently competitive whereas NERA concludes the opposite. It is clear then that the more detailed analysis along the lines proposed by the DOJ must be awaited before final conclusions can be drawn.

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APPENDIX

The tables in this appendix contain the summary statistics used in this paper to analyze the DOJ preliminary report. All data herein were compiled from that report (4).

TABLE A-1 Market Structure Data in Oil Pipeline Crude Origin Market

BEA	Herfindahl Index	No. of Pipelines	Pipeline Percentage of Market	BEA	Herfindahl Index	No. of Pipelines	Pipeline Percentage Of Market
002	10000	1	100	126	3724	6	100
010	6249	1	77.42	127	2555	7	96.57
046	8719	1	93.37	128	5648	3	100.00
047	3409	1	15.64	130	1290	2	14.05
065	10000	1	22.35	132	1299	9	94.79
066	10000	1	100.00	133	3344	1	20.78
069	4147	2	67.44	134	1882	8	97.08
070	3434	1	25.16	135	3479	1	10.14
071	5952	2	88.98	136	5962	2	87.6
072	8746	1	93.98	137	1953	9	81.92
074	9595	1	100.00	138	1404	10	89.15
080	4174	2	71.77	139	1740	1	4.3
081	9109	2	63.55	140	6773	2	100
083	2855	2	51.98	141	10000	1	100
105	5202	2	100	144	10000	1	100
106	5536	2	100	145	4224	3	100
107	1939	6	83.01	146	3908	3	94.63
108	4375	2	92.07	150	8145	2	100
112	5508	3	90.43	152	2693	4	97.06
113	1885	6	63.12	153	8121	1	89.83
114	5595	1	69.97	155	1684	4	66.00
115	3886	2	79.33	156	2747	3	69.65
116	3584	2	10.8	157	4343	4	76.59
117	3161	4	82.60	158	10000	1	100
118	4451	2	93.90	159	3172	4	94.27
119	3710	2	56.45	160	3572	1	51.22
120	2246	7	67.77	162	4461	2	88.68
121	1365	5	40.23	165	1904	2	16.84
122	1157	6	31.37	169	1940	1	35.29
124	8161	2	100	180	1407	1	2.13
125	4280	5	95.5				

TABLE A-2 Market Structure Data on Oil Pipeline Crude Destination Markets

BEA	Herfindahl Index 1	Herfindahl Index 2	No. of Pipelines	Pipeline Percentage of Market	BEA	Herfindahl Index 1	Herfindahl Index 2	No. of Pipelines	Pipeline Percentage of Market
010	9403	5507		96.97	120	2261	0	4	71.04
012	6741	3332		0	121	2060	2025	5	58.49
015	8202	8403		90.57	122	957	880	5	36.07
016	6285	2261		79.17	124	8629	0	2	99.58
047	3854	3563	3	82.38	125	5716	3816	2	83.13
057	3062	3271	2	100.00	126	6383	0	3	89.07
059	10000	9519	1	100.00	127	1772	0	5	80.047
065	7656	4455	1	100.00	128	1627	0	1	40.34
067	10000	4460	1	10.00	129	625	0	1	25.00
069	4593	3132	3	100	130	557	556	1	7.8
070	4242	2714	3	100	132	834	0	6	52.27
071	8842	5421	2	99.78	133	5116	0	1	71.52
072	8563	7202	2	95	135	3400	0	2	64.25
073	605	1291	1	24.59	136	2209	0	2	62.71
074	9724	0	1	98.61	137	2462	1527	4	75.40
075	10000	0	1	100.00	138	1424	1400	9	96.58
076	10000	3983	1	100	139	3295	1855	5	79.48
079	9937	4745	1	99.68	140	5469	0	1	73.95
080	4180	2975	2	86.13	145	3890	0	4	96.27
081	9823	9114	1	99.11	146	6457	5471	1	80.36
083	1670	1488	7	100.00	150	9398	0	2	100
095	10000	9486	1	100	151	2130	0	1	46.15
096	5052	4895	2	97.28	152	898	0	2	41.61
105	5434	0	3	99.46	153	8499	0	1	9219
106	5360	0	2	100.00	155	1236	0	3	49.85
107	4458	2452	4	98.07	156	1278	1211	6	74.12
108	8348	2607	2	96.96	157	2606	1558	2	70.59
112	560	4795	1	23.66	159	219	0	1	14.81
113	421	412	5	34.06	160	2718	1867	3	84.43
114	2586	3951	4	71.68	165	2383	1950	2	55.7
115	1453	8788	1	38.12	171	3111	2883	1	51.07
116	3659	3571	2	75.75	180	1092	1005	1	10.46
117	4250	3555	2	87.71					

TABLE A-3 Market Structure Data on Oil Pipeline Product Origin Markets

BEA	Herfindahl Index	No. of Pipelines	Pipeline Percentage of Market	BEA	Herfindahl Index	No. of Pipelines	Pipeline Percentage of Market
02	1	344		113	4	1688	66.67
05	1	741	26.98	114	2	5979	92.43
8	1	2884	53.7	115	1	9476	97.35
9	1	1906	43.66	116	2	8400	96.35
12	1	587	23.19	117	1	1276	35.71
18	5	668	52.13	118	1	8573	92.59
28	2	3250	80.06	120	1	1352	36.76
47	1	3239	49.53	121	3	4827	91.22
49	1	858	24.48	122	5	4142	87.39
65	1	85	9.22	125	1	112	10.59
69	1	8559	92.51	133	2	2633	64.34
70	2	5199	89.98	135	3	5548	86.51
71	1	985	31.38	136	1	7499	86.60
76	1	3569	59.74	137	3	1952	63.05
79	1	447	21.15	138	6	2635	94.55
80	1	1255	23.4	139	5	2070	89.60
81	2	7877	95.92	143	1	4571	67.61
83	7	972	61.72	155	2	3245	78.26
85	1	4921	70.15	156	3	2269	75.34
96	1	1302	36.08	165	1	2031	45.07
105	2	4395	82.11	169	1	2500	50.00
107	4	2219	70.96	171	1	2229	47.00
108	2	6287	85.71	172	1	538	22.22
111	1	6335	79.30	176	1	92	8.04
112	2	6205	97.74	180	2	332	24.26

TABLE A-4 Market Structure in Oil Pipeline Product Destination Markets

BEA	No. of Pipelines	Herfindahl Index (HH I)	Pipeline Percentage of Market (PIP %)	Adjusted Herfindahl Index (HHl)	BEA	No. of Pipelines	Herfindahl Index (HH I)	Pipeline Percentage of Market (PIP %)	Adjusted Herfindahl Index (HHl)
001	1	1736	37.93	1317	90	1	10000	100	10000
006	1	531	11.64	531	92	1	10000	100	10000
008	3	7343	98.69	2948	93	1	10000	100	10000
009	3	3604	100	3333	94	1	7379	85.71	6347
010	2	4186	80.77	4186	95	1	4594	47.89	3866
011	4	5145	100	2500	96	1	3600	40.34	3333
012	3	3604	71.89	1187	97	1	10000	100	1000
013	2	7804	100	5000	98	1	8521	92.31	8521
016	5	2372	89.38	1352	99	2	5080	93.28	2824
017	4	4232	100	2670	100	1	10000	100	10000
018	3	2372	59.27	758	101	1	10000	100	10000
019	1	9182	95.81	4442	102	2	5082	100	5000
020	2	7985	99.35	4621	103	3	4634	100	3333
021	2	5001	100	5000	104	1	10000	100	10000
22	2	8059	99.81	4661	105	5	4274	100	2000
23	1	4978	65.38	3096	106	3	5090	99.36	3058
26	1	10000	100	10000	107	5	2031	69.13	1247
27	1	10000	100	1000	108	4	3299	92.47	2000
28	2	6495	100	5000	110	4	10000	100	10000
29	2	6495	100	5000	111	2	5465	89.11	2187
31	2	6495	100	5000	112	4	4937	98.81	1012
35	1	10000	100	10000	114	3	5374	82.64	788
36	2	6485	99.92	4860	115	1	9227	96.02	1301
37	2	5034	100	5000	116	1	5455	8.23	2700
38	2	5669	100	5000	117	1	7025	82.70	2533
40	1	9420	97.06	9246	122	1	1300	17.61	467
48	1	10000	100	1000	125	2	8218	93.57	6683
49	2	6474	99.84	4558	126	2	5445	100	5000
50	1	8264	90.91	8264	137	5	1437	67.25	909
51	2	6834	100	5000	138	2	4572	65.91	3333
53	2	5968	100	5000	139	3	1517	51.49	1111
54	1	8590	92.65	8590	140	1	10000	100	10000
55	2	2033	56.40	945	141	1	10000	500	10000
57	1	2400	45.52	599	142	2	5182	100	5000
63	1	4444	40	4050	143	2	7146	100	5085
64	4	3009	100	2500	144	2	5509	100	5085
65	2	4788	80.07	3463	146	1	5011	47.62	5000
66	2	4930	91.94	4930	147	3	5261	100	3333
67	1	5254	70.85	2236	148	2	5266	100	5000
68	1	10000	100	10000	149	2	5556	100	5000
69	3	3075	57.62	2500	150	1	10000	100	1000
70	4	2521	56.31	2000	156	1	2867	19.67	2500
71	3	2887	85.45	2500	157	3	2143	71.74	2000

TABLE 4 continued

BEA	No. of Pipelines	Herfindahl Index (HH I)	Pipeline Percentage of Market (PIP %)	Adjusted Herfindahl Index (HHl)	BEA	No. of Pipelines	Herfindahl Index (HH I)	Pipeline Percentage of Market (PIP %)	Adjusted Herfindahl Index (HHl)
72	1	4290	50.56	3393	158	2	5895	100	5000
73	2	3520	82.61	3117	160	2	2347	50	2221
74	1	1000	100	1000	161	1	10000	100	10000
75	1	10000	100	1000	162	1	9383	96.82	9041
76	2	4643	89.38	3333	163	1	9065	95.08	8200
78	1	10000	100	10000	164	1	10000	100	10000
79	3	3781	90.18	2500	165	1	1634	19.55	1288
80	1	5129	65.95	2840	166	1	10000	100	10000
81	2	8395	28.8	5000	167	1	10000	100	10000
83	5	1629	46.43	1105	168	2	6543	100	5005
85	1	10000	100	10000	169	1	5057	71.1	0
86	1	6250	75	5000	170	1	10000	100	10000
87	1	2261	45.83	567	172	1	5894	76.19	3793
88	2	5113	100	5000	173	1	8664	93.02	8534
89	1	8950	94.58	7750					