PROJECTED SHALLOW-DRAFT TRAFFIC

OVERVIEW

System traffic was categorized into ten commodity groups. A summary of this classification scheme was presented earlier in table 2 - 5. The level of aggregation represented by the ten categories balances two competing requirements: 1) the need to generalize the specific information within each movement so as to facilitate analysis and, 2) the need to preserve as much as possible those unique attributes of each specific commodity. Tonnage projections are presented in this report according to the ten-group format, although projections for specific commodities were performed at a more detailed level where it was found to be appropriate.

A review of 1990 WCSC data (reconciled tonnage) shows that nearly 78 percent of total tonnage reported for IHNC Lock was associated with coal, crude petroleum, petroleum products and industrial chemicals. Metallic ores and non-metallic minerals accounted for another 15 percent of traffic through the lock. Movements of farm products, forest products, agricultural chemicals and miscellaneous cargoes were each less than 1 million tons--small volumes relative to the 23.5 million tons that passed through the lock in that year. A summary of IHNC Lock traffic in 1990 is presented in table 2 - 22. (A detailed discussion of the reconciliation process is presented in a subsequent section of the report.)

IHNC Lock traffic is only a portion of total system traffic. The two primary inland waterways that serve system traffic are segments of the Gulf Intracoastal Waterway: Mississippi River to Sabine River and Mobile Bay, Alabama to New Orleans, Louisiana. (Although the Gulf Intracoastal Waterway-Morgan City-Port Allen Alternate Route is comparable with the Mobile Bay to New Orleans segment in terms of throughput, most alternate route tonnage is common with the Mississippi River to Sabine segment.) Table 2 - 23 displays the distribution of traffic on these segments by commodity group and compares this distribution with that of the United States as a whole. Two characteristics of system traffic stand out: 1) with respect to the Mississippi River to Sabine River segment of the GIWW, 37 percent of all industrial chemical traffic and 33.5 percent of all crude petroleum traffic that is transported on the U.S. inland system was also routed through this waterway, and 2) with respect to coal, crude petroleum, industrial chemicals, and metallic ores and products, virtually all IHNC Lock traffic is accounted for in traffic recorded for the Mobile Bay to New Orleans

Table 2 - 22

IHNC Lock
1990 Traffic

Commodity	WCSC Unreconciled Tonnage	Percent	WCSC Reconciled Tonnage	Percent
Farm Products	371,118	1.63%	560,011	2.38%
Metallic Ores And Products	1,419,772	6.25%	1,419,772	6.04%
Coal	7,998,709	35.20%	7,998,709	34.05%
Crude Petroleum	2,290,608	10.08%	2,290,608	9.75%
Non-Metallic Minerals and Products	1,494,692	6.58%	2,075,399	8.83%
Forest Products	178,819	0.79%	178,819	0.76%
Industrial Chemicals	1,919,926	8.45%	1,919,926	8.17%
Agricultural Chemicals	500,879	2.20%	500,879	2.13%
Petroleum Products	6,000,634	26.41%	6,000,634	25.54%
Miscellaneous	547,639	2.41%	547,639	2.33%
Total	22,722,796	100.00%	23,492,396	100.00%

Source: Waterborne Commerce of the United States

Table 2 - 23

System Tonnage by Commodity For
Selected Waterway Segments

Commodity	U.S. Inland Traffic Total: Percent of 1990 Tonnage	GIWW: Mississippi River To Sabine River: Percent of 1990 Tonnage	GIWW: Mississippi River To Sabine River: Percent of U.S. 1990 Tonnage	GIWW: Mobile Bay, Ala., To New Orleans, La.: Percent of 1990 Tonnage	GIWW: Mobile Bay, Ala., To New Orleans, La.: Percent of U.S. 1990 Tonnage	Innerharbor Navigation Canal Lock: Percent of 1990 Tonnage	Innerharbor Navigation Canal Lock: Percent of GIWW-East Tonnage	Innerharbor Navigation Canal Lock: Percent of U.S. 1990 Tonnage
Farm Products	13.1%	2.1%	1.8%	1.7%	0.5%	1.6%	86.3%	0.5%
Metallic Ores And Products	3.4%	5.3%	17.7%	5.9%	7.4%	6.2%	94.1%	6.9%
Coal	30.7%	0.0%	0.0%	31.0%	4.3%	35.2%	100.0%	4.3%
Crude Petroleum	8.4%	25.0%	33.5%	8.9%	4.5%	10.1%	100.0%	4.5%
Non-Metallic Minerals and Products	12.7%	10.9%	9.7%	6.7%	2.3%	6.6%	85.9%	2.0%
Forest Products & Pulp	3.1%	0.1%	0.3%	1.3%	1.8%	0.8%	53.1%	1.0%
Industrial Chemicals	5.2%	17.1%	37.0%	8.9%	7.3%	8.4%	84.1%	6.1%
Agricultural Chemicals	1.9%	1.5%	9.1%	2.0%	4.5%	2.2%	97.9%	4.[illegible]
Petroleum Products	19.6%	34.1%	19.5%	31.3%	6.8%	26.4%	74.4%	5.1%
Miscellaneous	2.0%	3.9%	22.1%	2.4%	5.2%	2.4%	89.5%	4.6%
Total	100.0%	100.0%	11.2%	100.0%	4.3%	100.0%	88.1%	3.8%

Sources: 1. Waterborne Commerce of the United States
2. The 1992 Inland Waterway Review -- October 1992.

segment of the GIWW. A comparison of traffic for these two segments shows that an overwhelming majority of traffic on the Mobile to New Orleans segment is common to the IHNC Lock. In fact, among the major commodity groups, the lowest level of common traffic is found among petroleum products where nearly 75 percent of GIWW traffic for this group transits the IHNC Lock. Reported traffic for the Mobile to New Orleans segment is strongly representative of traffic through the IHNC Lock.

A review of commodity-specific traffic flows over the last decade on the Mobile to New Orleans segment, as summarized in Table 2 - 24, confirms earlier observation that coal, crude petroleum, petroleum products and industrial chemicals dominate traffic through the IHNC Lock. A similar concentration of traffic in these commodity groups exists for traffic on the Mississippi River to Sabine segment of the GIWW, with the exception of coal which shows insignificant volumes. In view of the fact that these four groups represent a large majority of system traffic, projections for these commodities in large measure dictate the level of total system traffic. Because of their importance, traffic projections for these groups must be regionally focused and specific to existing origin-destination patterns in order to be meaningful.

PROJECTIONS OF COAL TRAFFIC

Background

Waterborne Commerce statistics reported that 7,999,000 tons of coal transited the IHNC Lock in 1990, which represented over 35 percent of shallow-draft traffic through the lock in that year. The volume of coal traffic on the system that does not transit IHNC is negligible. The projection of future coal traffic is, therefore, a very important component of aggregate lock tonnage projections. Of the nearly eight million tons of coal that transited the lock in 1990, 91 percent was destined for four electric utility plants located in Mississippi and Florida. These facilities generate the energy needed to operate steam turbines by burning coal which is currently mined in the North Appalachian, Central Appalachian and Illinois basins and transported by barge via the Ohio and Mississippi Rivers and the Gulf Intracoastal Waterway. Although coal traffic through IHNC is largely dependent upon the demand for energy among a relatively small number of facilities, these utilities seek to ensure future supplies at stable prices by negotiating multi-year contracts. As a result, related coal tonnage through the lock has varied little from year to year. According to WCSC, total annual coal traffic to these specific facilities averaged 7,470,000 tons from 1985 to 1990 and over this period, annual

Table 2 - 24

Historical Traffic
On the Gulf Intracoastal Waterway
1980 Through 1990
(In Thousands of Short Tons)

Gulf Intracoastal Waterway, Mobile Bay, Ala., to New Orleans, La.

Year	Farm Products	Metallic Ores and Products	Coal	Crude Petroleum	Non-Metallic Minerals	Forest Products And Pulp	Industrial Chemicals	Agricultural Chemicals	Petroleum Products	Miscellaneous Products (Marine Shell)	Miscellaneous Products (Non-Shell)	Total
1980	739	418	3,950	1,729	1,512	276	1,420	1,073	6,140	1080	366	18,703
1981	552	859	3,346	999	1,629	239	1,538	906	6,132	979	163	17,342
1982	403	314	3,240	931	1,283	192	1,281	725	5,885	732	198	15,184
1983	517	767	2,978	1,314	1,284	199	1,453	657	6,419	807	130	16,525
1984	654	500	5,956	2,109	1,290	139	1,733	724	6,397	800	111	20,413
1985	694	647	6,086	2,696	1,674	244	1,521	603	6,475	800	137	21,577
1986	685	746	7,546	3,024	1,165	166	1,681	422	7,281	755	118	23,589
1987	530	773	7,332	3,190	982	173	2,125	319	7,818	706	122	24,070
1988	847	1,307	6,661	2,975	1,460	393	3,232	273	8,642	602	281	26,673
1989	543	939	7,352	3,111	1,321	338	2,029	245	9,203	404	135	25,620
1990	430	1,509	8,003	2,291	1,740	337	2,282	512	8,066	431	181	25,782
Avg.	599	798	5,677	2,215	1,395	245	1,845	587	7,133	736	177	21,407
Pct.	2.8%	3.7%	26.5%	10.3%	6.5%	1.1%	8.6%	2.7%	33.3%	3.4%	0.8%	100.0%

Gulf Intracoastal Waterway, Mississippi River, La., to Sabine River, Tex.

Year	Farm Products	Metallic Ores and Products	Coal	Crude Petroleum	Non-Metallic Minerals	Forest Products And Pulp	Industrial Chemicals	Agricultural Chemicals	Petroleum Products	Miscellaneous Products (Marine Shell)	Miscellaneous Products (Non-Shell)	Total
1980	831	3,642	99	12,241	5,289	37	8,494	977	18,532	3651	1059	54,852
1981	880	3,801	121	10,993	4,419	58	8,733	922	18,416	3044	1074	52,461
1982	815	1,926	15	12,263	4,972	30	8,155	968	17,727	2497	920	50,288
1983	922	1,599	60	13,238	4,957	27	8,991	907	17,144	2780	833	51,458
1984	813	2,529	24	14,414	6,103	51	9,898	839	17,480	2737	828	55,716
1985	1210	3,174	64	14,881	7,987	30	9,550	690	19,121	3010	3257	62,974
1986	1642	2,526	72	17,551	6,592	41	11,218	738	20.151	2371	1473	64,375
1987	1579	2,587	34	16,098	6,199	74	12,627	789	20,305	2030	1583	63,905
1988	1428	2,890	8	16,953	6,854	93	12,871	901	23,610	1478	2095	69,181
1989	1680	2,651	20	14,492	6,173	31	12,260	876	25,661	1677	796	66,317
1990	1433	3,614	8	16,882	7,382	65	11,568	1,032	23,046	1194	1429	67,653
Avg.	1,203	2,813	48	14,546	6,084	49	10,397	876	20,108	2,406	1,395	59,925
Pct.	2.0%	4.7%	0.1%	24.3%	10.2%	0.1%	17.3%	1.5%	33.6%	4.0%	2.3%	100.0%

Source: Waterborne Commerce of the United States deliveries to these locations did not vary by more than eight percent from the average. Approximately 95 percent of this tonnage was routed through IHNC. Of the 133.2 million tons of coal that the U.S. Department of Energy (DOE) reported was transported by barge in 1990 to electric utilities nationwide, 7.3 million (5.5 percent) was routed through the IHNC Lock.

Future Coal Demand

Future coal traffic through the IHNC is largely a function of the projected consumption of coal by four steam plants located in Mississippi and Florida. The factors that affect the long-run demand for coal among the utilities that operate these plants are common to the industry as a whole. Although, utilities' coal demand commonly reflects the regional demand for electricity, the industry-wide demand for coal in the future will be further conditioned by the manner in which utilities comply with the emission standard mandated by the Clean Air Act Amendments of 1990. This standard requires coal-burning facilities to reduce sulphur-dioxide emissions to 2.5 pounds for each one million British Thermal Units (BTUs) of total energy consumed beginning in the year 1995 and to half that amount in the years 2000 and beyond. Efforts to comply with this legislation will effect, on a national level, changes in the demand for coal, the demand for waterborne transportation of coal, and the pattern of coal flows over the nation's waterways.

Of the four facilities previously mentioned, one (Company A) was designed and constructed under stringent regulatory guidelines which ensures that sulphur emissions will be within the range specified in the 1990 legislation. This utility is therefore not required to take any further actions with respect to compliance with the emissions standards. This facility accounts for a considerable portion of all coal traffic through the IHNC lock and thus represents an important factor in the development of traffic projections for coal.

In contrast, the remaining three plants do not currently comply with the sulphur emission standard. These plants currently burn coal that is relatively high in sulphur content while lacking the pollution control devices necessary to bring the quantity of sulphur emissions within the regulatory standard. In order to comply with the emission standard in 1995, two of the remaining utilities (Companies B and C) individually assessed several options which are summarized below.

First, the utilities could substitute low-sulphur coal for high-sulphur coal. The Tennessee Valley Authority and the Institute for Water Resources have indicated that between 25 to 30 percent more low-sulphur coal is required to yield the same BTU output of a given quantity of high-sulphur coal. Low-sulphur coal is mined in the Powder River basin (Montana and Wyoming), Central Appalachia (West Virginia, Kentucky and Tennessee) and, to a much smaller extent, in the Illinois basin (Illinois, Indiana and Kentucky). Low-sulphur coal imported from South America is an alternative to domestic sources, although the utilities have stated that they would not rely on import coal as the sole source of supply. Furthermore, mixing of imported coal with a domestic source may be required which would most likely be conducted at a Lower Mississippi River location where adequate landside space is available for this process. In either case of domestic or imported coal, the strict substitution of low-sulphur for high-sulphur coal would likely generate a net increase in coal traffic through the IHNC lock for the same level of electricity demand. Company B views a switch to low-sulphur coal as its most likely course of action while company C suggests that it will substitute low-sulphur coal for at least a portion of its total energy demand.

Second, natural gas can substitute for coal to reduce annual sulphur emissions to a level within the allowed standard. In this case, Company B would be required to retrofit its electricity generating units with gas-fired burners, an option which the company has stated is not under consideration. In contrast, most units at the plant operated by Company C already possess the capability to switch between coal and natural gas and the company plans to extend this capability to the remaining units. It is possible that coal consumption at this plant will fall and that projections of coal traffic through the IHNC lock would reflect the degree to which this occurs. However, natural gas would not entirely replace coal and a reduction in the sulphur content of the residual coal would still be required. In the past, Company C burned more natural gas and less coal during periods where natural gas prices were comparatively low, reflecting seasonal or cyclical market conditions. To this extent, the demand for coal is inversely related to the demand for natural gas. Actions that are required to conform to the clean air standard will not change the nature of this practice.

Third, burning facilities can be fitted with scrubbers which are designed to remove sulphur particles by treating the pollutants prior to emission. The multi-million dollar cost of these devices represents a very large up-front capital expenditure which must be compared to alternatives that spread the cost of compliance over time. Companies B and C have stated that they do not consider the installation of scrubbers to represent a viable option.

Last, governing legislation allows the marketing of sulphur emission allowances which constitute tangible financial assets of those utilities that succeed in generating sulphur emissions below specifically mandated levels. The market for sulphur emission allowances is in its formative stage. It is expected that the volatility in this market will not be less than in the coal market itself. Given the inherent unpredictability of the value and availability of emission allowances, utilities in general will be hard-pressed to depend upon allowance purchases over the long-run and will resist it as a fundamental means of regulatory compliance. So far, emission allowances have only been used to address short-term supply needs: coal suppliers have purchased a number of allowances from utilities for resale in a package which includes higher sulphur coal. In any event, excessive emissions permitted under the system of marketable allowances may directly conflict with ambient air-quality standards established by independent legislation, particularly at the state level, thus limiting the degree to which allowances can be used. For the industry as a whole, the value of this alternative is likely confined to its use as an intermediate measure which will accommodate utilities that, in the transition, find it in their interest to avoid an immediate commitment to one of the preceding alternatives. Neither Company B nor Company C plan to use emission allowances in their programs to comply with the emissions standards that take effect in 1995.

According to Companies B and C, no decisions have yet been made with respect to a long-term plan to comply with the new emission standard. However, representatives of these utilities have indicated what options they favored during the period of transition. For the two plants operated by the Company B, high-sulphur coal will be replaced with low-sulphur coal which will be mined in Central Appalachia. Although some consideration is being given to importing as much as half of their low-sulphur coal requirement which would be mixed with a domestic source at the port of import, we do not expect this practice to represent a long-term source of coal. In contrast, the Company C will substitute high-sulphur coal with low-sulphur coal and natural gas in proportions which the utility has not yet determined. Projections of coal tonnage for this company will be based on a substitution of low-sulphur for high-sulphur coal but will include a projection scenario which maximizes the substitution of natural gas for coal.

Projections of Coal Traffic Through IHNC Lock

Projections of coal traffic through IHNC Lock were the result of a two-step process. First, the 1990 base tonnage was increased to reflect the shift from high-sulphur to low-sulphur coal by three of the four electricity generating plants, identified in the preceding section, that are required to comply by 1995 with the sulfur emission standard (the remaining plant currently complies with the standard and will continue to use high-sulphur coal). To yield an equal amount of energy, measured in BTUs, 27 percent more low-sulphur coal will be required for every ton of high-sulphur coal that is substituted. Therefore, the 1990 base year tonnage for three of the four facilities was increased by 27 percent to reflect the effect of regulatory compliance.

Second, 1993 DOE regional projections of coal consumption by electricity-generating utilities were used as a basis to project growth in waterborne coal traffic. DOE projections were specific to ten regions of the United States, one of which, the southeast, was found to include the entire area served by the Gulf Intracoastal Waterway east of the Mississippi River. The states included in the southeast region are Mississippi, Alabama, Florida, Georgia, Kentucky, Tennessee, South Carolina and North Carolina. The growth factors for coal consumption by electricity-generating utilities in this region are displayed in table 2 - 25. These growth factors are used to represent the growth in coal traffic on the GIWW. As table 2 - 25 shows, traffic growth rates were developed for the periods 1990 to 2000, and 2000 to 2010.

Table 2 - 25 includes separate sets of growth rates for each of four macroeconomic cases. The economic assumptions that underlie these four cases are summarized in table 2 - 26. The Reference Case is a baseline scenario (or base case) and represents the level of future energy consumption that is consistent with economic conditions that are most likely to prevail in the future. These economic conditions include an annual gross domestic product (GDP) growth rate of 2.0 percent, a world oil price in the $19 to $23 per barrel range through the 1990's (rising to $29 by 2010), and economically recoverable oil and natural gas resources of 94 billion barrels and 892 trillion cubic feet, respectively.

In addition to the Reference Case, three alternative macroeconomic cases are identified (World Oil Prices, Economic Growth and Oil and Gas Recovery) which represent independent conditions that shape the production and

Table 2 - 25

Growth Factors for Coal Consumption
By Electricity-Generating Facilities
Southeastern United States

		Growth Factors		Average Annual Growth	
Case	Scenario	1990 To 2000	2000 To 2010	1990 To 2000	2000 To 2010
Reference		1.09	1.16	0.91%	1.52%
World Oil Prices	High	1.10	1.15	0.92%	1.44%
World Oil Prices	Low	1.10	1.17	0.91%	1.54%
Economic Growth	High	1.10	1.20	0.95%	1.87%
Economic Growth	Low	1.09	1.09	0.90%	0.86%
Oil and Gas Recovery	High	1.09	1.17	0.91%	1.54%
Oil and Gas Recovery	Low	1.10	1.21	0.92%	1.96%

Source: Supplement to the Annual Energy Outlook - 1993.
Energy Information Administration
U.S. Department of Energy

consumption of energy and related products. For each case, a high and low growth scenario is specified.

The World Oil Price Case accounts for the effect on the consumption of coal, crude petroleum, and petroleum products of higher or lower world oil prices. The high scenario combines the Reference Case economic growth trend with higher world oil prices starting at $19 per barrel in 1991 and rising gradually to $38 in 2010. The net effect of higher oil prices is a lower level of economic growth over the projection period and a substitution of coal for petroleum-based energy by the year 2010. The low scenario combines the Reference Case economic growth trend with lower world oil prices that will fall to $14 per barrel by 1999 and rise to $13 per barrel by 2010. The effect of lower world oil prices is to increase the level of economic growth in the United States and to encourage the substitution of petroleum-based energy for coal through the year 2010.

The Economic Growth Case reflects the changes in energy demand caused by higher or lower levels of growth in GDP. The high scenario combines the level of world oil prices expected under the Reference Case with economic growth of 2.4 percent. Higher growth is associated with increased industrial production and high levels of energy-related products transported on waterway modes. Under the low scenario, a lower level of energy-related traffic is expected due to economic growth of only 1.6 percent per year.

The Oil and Gas Recovery Case reflects the inherent uncertainties surrounding estimates of domestic oil and gas resource estimates. While the quantity of oil and gas reserves indicated under Reference Case represents the expected value (50th percentile) of a distribution of reserve estimates made by the U.S. Geological Survey, the high scenario represents the quantity of reserves prevailing at the 95th percentile reserve estimate and the low scenario represents the quantity of reserves prevailing at the 5th percentile reserve estimate. The high scenario is consistent with economically recoverable reserves of 126 billion barrels of crude oil and 1,125 trillion cubic feet of natural gas. Under this scenario, coal consumption remains essentially unchanged. The low scenario is consistent with economically recoverable reserves of 75 billion barrels of crude oil and 721 trillion cubic feet of natural gas. Under the low scenario, greater quantities of coal are consumed to compensate for the lower than expected levels of oil and gas resources.

The energy demand growth factors displayed in table 2 - 25 were combined with the low-sulphur demand growth factor of 1.27 (reflecting the consequence of regulatory compliance for relevant coal movements) and applied to the 1990 base tonnage to produce estimates for future tonnage. The results of these calculations appear in table 2 - 27 for the Reference Case and each of the remaining scenarios. Under the Reference Case, the aggregate quantity of coal that will transit the IHNC lock will increase by 28 percent from 1990 to 2000 (an average annual rate of 2.5 percent, although most of the increase will occur in the Clean Air Act compliance year of 1995) and by 16 percent from 2000 to 2010 (an average annual rate of 1.5 percent). The 1.5 percent annual growth rate for the period 2000 to 2010 was carried forward for the remaining years of the project. The tonnages for coal displayed in table 2 - 27 represent coal traffic through IHNC that is unconstrained by lock congestion. Coal traffic through the lock represents virtually all coal traffic through the system.

The growth factors for coal under the high economic growth scenario and the high oil and gas recovery scenario each represent a different response to Clean Air Act requirements by one of the three major utilities that transport coal through the IHNC Lock. One of the utilities has indicated that imports of low-sulphur coal from Venezuela through the Lower Mississippi River represented an alternative to Central Appalachian coal, although the switch to low-sulphur Central Appalachian coal would be the likely form of regulatory compliance. For this utility, the high economic growth scenario represented a set of macroeconomic conditions which would most likely result in higher prices for domestic energy resources and in a subsequent decision by the utility to import additional coal. Under this scenario, half the tonnage associated with this movement consists of high-sulphur coal shipped from Central Appalachia to the Lower Mississippi River where it is blended with an equal quantity of (very) low-sulphur coal that is imported from Venezuela and then shipped through the IHNC to the utility. Another of the three utilities indicated that natural gas represents a preferred energy source to low sulphur coal depending upon the relative prices of the two commodities. Their relative prices, in turn, reflect the relative quantities of these commodities that are available. Under the high oil and gas resource scenario, the abundance of natural gas is highest and natural gas is more price competitive with coal. The possibility that this utility would switch to natural gas, rather than low-sulphur coal, as the fundamental method of regulatory compliance was incorporated into this scenario. Under these circumstances the utility indicated that it would continue to ship 20 percent of the low-sulphur coal

Table 2 - 26

Macroeconomic Assumptions
For Reference Case And Projection Scenarios

Case	Scenario	GDP Annual Growth	World Oil Price Per Bbl		Economically Recoverable Oil in Billion Bbls	Economically Recoverable Gas in Trillion Cuft
Reference		2.0	19-23/29	^	94	892
World Oil Prices	High	2.0	19/38	^^	94	892
World Oil Prices	Low	2.0	14/18	^^^	94	892
Economic Growth	High	2.4	19-23/29		94	892
Economic Growth	Low	1.6	19-23/29		94	892
Oil and Gas Recovery	High	2.0	19-23/29		126	1125
Oil and Gas Recovery	Low	2.0	19-23/29		75	721

Notes: ^ $19-23 for the 1990's and rising to $29 by 2010.
^^ $19 in 1991 and rising to 38 in 2010.
^^^ Falling to $14 by 1999 and rising to $18 by 2010.

Source: Supplement to the Annual Energy Outlook - 1993.
Energy Information Administration
U.S. Department of Energy

Table 2 - 27

Projected Coal Traffic
IHNC Lock
(In Thousands of Short Tons)

Projection Scenario	Annual Growth 1990-2000	2000-2010	Projection Years 1990	2000	2010	2020	2030	2040	2050	2060
Reference	2.6%	1.5%	7,999	10,308	11,987	13,940	16,210	18,850	21,920	25,491
Oil Price - High	2.6%	1.4%	7,999	10,320	11,909	13,742	15,858	18,299	21,116	24,366
Oil Price - Low	2.6%	1.5%	7,999	10,314	12,023	14,016	16,338	19,045	22,201	25,879
Econ Growth- High	2.2%	1.9%	7,999	9,964	11,992	14,432	17,369	20,903	25,157	30,276
Econ Growth - Low	2.6%	0.9%	7,999	10,296	11,217	12,220	13,313	14,503	15,800	17,213
O/G Recovery-High	0.2%	1.5%	7,999	8,199	9,554	11,132	12,971	15,114	17,611	20,521
O/G Recovery- Low	2.6%	2.0%	7,999	10,320	12,535	15,225	18,491	22,459	27,279	33,132

that it would consume under the Reference Case, shifting the remainder of their energy requirements to natural gas which would be shipped by pipeline.

PROJECTIONS OF CRUDE PETROLEUM TRAFFIC

Background

a. Gulf Intracoastal Waterway: Mobile Bay, Ala. To New Orleans, La. In 1990, 2,291,000 tons of crude petroleum transited the IHNC Lock, representing nearly ten percent of total lock traffic. Approximately 90 percent of the crude petroleum routed through the IHNC in 1990 was destined for eight specific facilities on the Lower Mississippi River, GIWW-West and in Mobile, Ala. Crude petroleum discharged at these locations are used as feedstock for local refineries which have strict requirements with respect to the grade and composition of the petroleum used in their operations.

The IHNC Lock averaged 2,215,000 tons of crude petroleum for the period 1980 through 1990. This estimate was based on Waterborne Commerce statistics for the Mobile to New Orleans segment of the GIWW since virtually all crude petroleum traffic on this segment also transited the IHNC lock. Table 2-24 shows that crude petroleum traffic on this segment grew steadily from 1982 to 1987 and held constant through 1989 before falling significantly in 1990. An inspection of 1989 Waterborne Commerce detailed records indicates that between 50 and 60 percent of IHNC Lock traffic is common to traffic on the GIWW west of the Mississippi River.

b. Gulf Intracoastal Waterway: Mississippi River To Sabine River. Most crude petroleum transported on waterway system defined for this study is associated with the Louisiana section of the GIWW west of the Mississippi River. As reported by Waterborne Commerce in table 2 - 24, this segment averaged 14.5 million tons from 1980 through 1990. Table 2 - 24 also shows that crude petroleum traffic grew steadily from 1981 to 1986, after which reported tonnage exhibited an erratic pattern, indicating no tendency for growth or decline.

Projections of Crude Petroleum Traffic

a. Crude Traffic Not Common With the IHNC. Because growth in crude petroleum traffic on the GIWW was inconsistent from 1987 through 1990, trend analysis cannot serve as a basis for projecting future traffic. Instead, projections of crude petroleum traffic on the GIWW should reflect the expected level of regional crude petroleum production. Projections of crude petroleum production in the years 2000 and 2010 were prepared by DOE and are used in this analysis to represent future growth in waterborne traffic in crude petroleum.

DOE projections for crude oil production within the continental United States are disaggregated to six regions one of which, the Gulf Coast region (representing Florida, Alabama, Mississippi, Louisiana and Southeastern Texas), was selected to represent activity on the GIWW. In addition to the Reference Case, petroleum supply projections include high and low growth scenarios for each of three macroeconomic cases which were described in detail in the preceding section. DOE also prepared separate projections for onshore and offshore production. Onshore production estimates were chosen to represent future traffic growth on the GIWW since the transportation of petroleum extracted offshore is far more likely to be associated with pipelines. Estimates of the number of barrels of crude oil produced from onshore fields located in the gulf region and the associated growth factors for the Reference Case and all other scenarios are detailed in table 2 - 28. The growth factors that prevail in the year 2010 are used as the growth factors for the remainder of the study period.

b. Crude Traffic Through the IHNC Lock. DOE projections of crude petroleum production in the gulf region were also used to estimate future crude petroleum traffic through the IHNC Lock. It must be recognized, however, that crude traffic through the IHNC Lock is partially independent of the crude traffic through the remainder of the system. This partial independence is reflected, in some measure, in the differential growth rates in crude traffic between the IHNC Lock and the GIWW west of the Mississippi River over the previous decade. As mentioned earlier, crude petroleum traffic through the IHNC Lock grew steadily from 1982 to 1987 and held constant through 1989 before declining significantly in 1990. In contrast, crude petroleum traffic on the Mississippi River to Sabine segment of the GIWW, while growing steadily from 1981 to 1986, fluctuated for the remaining four years of the decade. While the factors that determine the level of regional waterborne transportation in crude petroleum may, in the long run, equally affect traffic through the lock and the remainder of the system, these factors have not resulted, according to recent data, in similar traffic patterns between these two segments.

c. System Traffic for Crude Petroleum. The growth factors appearing in table 2 - 28 were applied to the 1990 base traffic that was routed through both the IHNC Lock and

Table 2 - 28

Crude Oil Production
Gulf of Mexico - Onshore
Gulf Intracoastal Waterway
Mississippi River to Sabine River

	1990	2000	2010
	Millions of Barrels Per Day (Annual Growth Rate)		
Reference Case	1.03	0.71 (-3.7%)	0.91 (2.5%)
World Oil Price Case			
High	1.03	0.84 (-2.0%)	1.04 (2.2%)
Low	1.03	0.48 (-7.4%)	0.66 (3.2%)
Economic Growth Case			
High	1.03	0.70 (-3.8%)	0.89 (2.4%)
Low	1.03	0.71 (-3.7%)	0.89 (2.3%)
Oil & Gas Recovery Case			
High	1.03	0.73 (-3.4%)	0.96 (2.8%)
Low	1.03	0.70 (-3.8%)	0.82 (1.6%)
	Growth Factors		
Reference Case	-	0.689	1.282
World Oil Price Case			
High	-	0.816	1.238
Low	-	0.466	1.375
Economic Growth Case			
High	-	0.680	1.271
Low	-	0.689	1.254
Oil & Gas Recovery Case			
High	-	0.709	1.315
Low	-	0.680	1.171

Source: Supplement to the Annual Energy Outlook - 1993
Energy Information Administration
U.S. Department of Energy

the entire system to yield a set of projected tonnages for the years 2000 through 2010. The process was repeated for each of the six DOE scenarios. The results appear in table 2 - 29. These rates show a significant decline in production and traffic between 1990 and 2000. In contrast, tonnage in the year 2010 shows a significant recovery from traffic levels in the year 2000. The relatively high rate of growth for the recovery period 2000-2010 in large measure reflects the effect relatively low growth rate for the period 1990-2000. The percent change in traffic for the period 1990 through 2010 is small. For projected traffic in the years 2020 and beyond, the average annual rate used to grow traffic was based on the 20-year period 1990 through 2010 rather than the 10-year period 2000 through 2010.

PROJECTIONS OF PETROLEUM PRODUCTS TRAFFIC

Background

In 1990, over 6 million tons of petroleum products transited the IHNC, representing a quarter of total lock tonnage and nearly three quarters of all petroleum products traffic on the segment of the GIWW between Mobile, Ala. and New Orleans, La. WCSC reported that nearly 20 percent (23,046 million tons) of all waterborne traffic in petroleum products nationwide used the GIWW from the Mississippi to Sabine Rivers. Petroleum products therefore constitute an important component of system traffic.

Petroleum products as a category represents an aggregate of the following commodity groups: gasoline; jet fuel; kerosene; distillate fuel oil; residual fuel oil; lubricating oil and greases; naphtha and petroleum solvents; asphalt, tars and pitches; coke and petroleum coke; liquefied gasses and other petroleum and coal products. Most of these commodities are produced by refineries that are located in or near Pascagoula, Miss. and Corpus Christi, Tex. and along the Lower Mississippi River, including New Orleans, LA.

Projections of Petroleum Products Traffic

Projections of waterborne traffic associated with petroleum products reflect future levels of product consumption which are expected within those regions of the U.S. that currently receive petroleum products shipped through the IHNC. Future energy consumption by commercial, industrial, residential, transportation and utility sectors of specific regional economies was estimated by the Department of Energy in its Supplement to the Annual Energy Outlook (AEO) which was published in 1993. In using the AEO projections,

Table 2 - 29

Projected Crude Petroleum Traffic
(In Thousands of Short Tons)

	Annual Growth		Projection Years							
Projection Scenario	1990-2000,	2000-2010	1990	2000	2010	2020	2030	2040	2050	2060
IHNC Lock Traffic										
Reference	-3.7%	2.5%	2,291	1,578	2,024	1,902	1,787	1,680	1,579	1,484
Oil Price - High	-2.0%	2.2%	2,291	1,869	2,314	2,326	2,338	2,350	2,362	2,374
Oil Price - Low	-7.4%	3.2%	2,291	1,068	1,468	1,175	941	753	603	482
Econ Growth- High	-3.8%	2.4%	2,291	1,558	1,980	1,841	1,711	1,591	1,479	1,375
Econ Growth - Low	-3.7%	2.3%	2,291	1,578	1,979	1,840	1,710	1,590	1,478	1,374
O/G Recovery-High	-3.4%	2.8%	2,291	1,624	2,136	2,062	1,991	1,923	1,857	1,793
O/G Recovery- Low	-3.8%	1.6%	2,291	1,558	1,824	1,628	1,453	1,296	1,157	1,032
System Traffic										
Reference	-3.7%	2.5%	15,286	10,532	13,502	12,690	11,926	11,209	10,535	9,901
Oil Price - High	-2.0%	2.2%	15,286	12,473	15,442	15,521	15,600	15,679	15,759	15,839
Oil Price - Low	-7.4%	3.2%	15,286	7,123	9,795	7,840	6,276	5,024	4,021	3,2
Econ Growth- High	-3.8%	2.4%	15,286	10,394	13,211	12,282	11,418	10,615	9,869	9,175
Econ Growth - Low	-3.7%	2.3%	15,286	10,532	13,207	12,276	11,411	10,607	9,859	9,164
O/G Recovery-High	-3.4%	2.8%	15,286	10,838	14,252	13,761	13,287	12,830	12,388	11,962
O/G Recovery- Low	-3.8%	1.6%	15,286	10,394	12,172	10,862	9,692	8,649	7,718	6,887

changes in the future regional consumption of petroleum products were related to proportional changes in the delivery of these commodities through the waterway mode.

The AEO contains estimates of current and future consumption of gasoline, jet fuel, distillate fuel oil, residual fuel oil, liquefied petroleum gas and other petroleum products expressed in BTUs. Furthermore, the AEO provides individual estimates for each of ten regions in the United States, three of which receive petroleum products that are part of system traffic. These three regions are: South Atlantic (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee), Southwest (Arkansas, Louisiana, New Mexico, Oklahoma, Texas) and Midwest (Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin). From the AEO consumption estimates for each commodity and region, growth factors were calculated for the periods 1990 to 2000 and 2000 to 2010 which represent the Reference Case. These factors were then applied to tonnages for individual commodity movements. The growth factor that was applied to the tonnage within an individual movement corresponded to the region in which the destination port of the movement is associated. Finally, a set of growth factors were derived for each of three macroeconomic cases that appear in the AEO: the Oil Price Case, the Economic Growth Case and the Oil Recovery Case. As with the projections for coal and crude, for each of these cases a high growth and a low growth scenario was considered. The comprehensive set of growth factors derived from the AEO publication appears in table 2 - 30. These growth factors were then multiplied against base tonnages for all cases and for specific movements in order to yield unconstrained tonnage estimates for the system in the years 2000 and 2010. For project years beyond 2010, the rates of traffic growth were held to those prevailing in the year 2010. A summary of system traffic and IHNC Lock traffic in petroleum products is provided in table 2 - 31.

PROJECTIONS OF WATERWAY TRAFFIC IN OTHER COMMODITY GROUPS

Background

Together, coal, crude petroleum and petroleum products accounted for nearly 72 percent of total IHNC Lock traffic in 1990. The remaining 28 percent of lock traffic falls among seven commodity groups: farm products, metallic ores and products, non-metallic minerals and products, forest products, industrial chemicals, agricultural chemicals and miscellaneous cargo. Because coal is not a major component of traffic on the Mississippi River to Sabine River segment of the GIWW, coal, crude and petroleum products constituted

Table 2 - 30

Petroluem Products
Growth Factors

Reference Case	Gasoline	Jet Fuel	Distillate	Residual	LPG	Other
1990 - 2000						
South Atlantic	1.13	1.18	1.18	1.36	1.15	0.97
Southwest	1.14	1.31	1.17	1.24	1.28	0.95
Midwest	1.06	1.11	1.15	1.52	1.60	0.95
2000 - 2010						
South Atlantic	1.11	1.27	1.16	1.04	0.97	1.00
Southwest	1.08	1.20	1.15	1.16	1.13	1.01
Midwest	1.02	1.09	1.04	0.76	1.04	1.01

High Oil Price	Gasoline	Jet Fuel	Distillate	Residual	LPG	Other
1990 - 2000						
South Atlantic	1.09	1.15	1.15	1.30	1.11	0.95
Southwest	1.10	1.28	1.15	1.20	1.20	0.93
Midwest	1.02	1.08	1.12	1.12	1.54	0.93
2000 - 2010						
South Atlantic	1.07	1.25	1.15	1.06	0.96	1.00
Southwest	1.05	1.19	1.13	1.16	1.11	1.01
Midwest	1.02	1.09	1.04	0.76	1.04	1.01

Low Oil Price	Gasoline	Jet Fuel	Distillate	Residual	LPG	Other
1990 - 2000						
South Atlantic	1.19	1.23	1.25	2.58	1.23	1.01
Southwest	1.20	1.37	1.29	1.36	1.47	0.99
Midwest	1.12	1.16	1.22	1.96	1.69	0.98
2000 - 2010						
South Atlantic	1.15	1.28	1.23	0.99	0.99	1.00
Southwest	1.13	1.22	1.20	1.15	1.16	1.01
Midwest	1.06	1.10	1.08	2.16	1.07	1.01

High Economic Growth	Gasoline	Jet Fuel	Distillate	Residual	LPG	Other
1990 - 2000						
South Atlantic	1.15	1.28	1.23	1.62	1.16	0.98
Southwest	1.16	1.42	1.22	1.28	1.30	0.95
Midwest	1.08	1.20	1.19	1.46	1.62	0.96
2000 - 2010						
South Atlantic	1.14	1.35	1.19	0.80	0.98	1.01
Southwest	1.12	1.28	1.18	1.17	1.15	1.02
Midwest	1.05	1.16	1.08	0.96	1.06	1.02

Table 2 - 30
(Cont.)

Low Economic Growth	Gasoline	Jet Fuel	Distillate	Residual	LPG	Other
1990 - 2000						
South Atlantic	1.11	1.08	1.12	1.15	1.14	0.95
Southwest	1.12	1.20	1.12	1.20	1.26	0.93
Midwest	1.04	1.02	1.10	1.39	1.57	0.93
2000 - 2010						
South Atlantic	1.07	1.18	1.13	1.37	0.95	1.00
Southwest	1.05	1.12	1.11	1.14	1.09	1.01
Midwest	0.99	1.01	1.02	0.82	1.02	1.01

High Oil Recovery	Gasoline	Jet Fuel	Distillate	Residual	LPG	Other
1990 - 2000						
South Atlantic	1.13	1.18	1.17	1.36	1.14	0.97
Southwest	1.14	1.31	1.17	1.24	1.27	0.95
Midwest	1.06	1.11	1.15	1.41	1.59	0.95
2000 - 2010						
South Atlantic	1.10	1.27	1.15	1.03	0.96	1.01
Southwest	1.08	1.21	1.14	1.16	1.11	1.01
Midwest	1.01	1.09	1.04	0.94	1.04	1.01

Low Oil Recovery	Gasoline	Jet Fuel	Distillate	Residual	LPG	Other
1990 - 2000						
South Atlantic	1.13	1.18	1.17	1.37	1.16	0.97
Southwest	1.14	1.31	1.17	1.24	1.30	0.95
Midwest	1.06	1.11	1.15	1.34	1.60	0.95
2000 - 2010						
South Atlantic	1.11	1.26	1.16	1.04	0.98	1.00
Southwest	1.08	1.20	1.15	1.16	1.15	1.01
Midwest	1.02	1.09	1.05	0.90	1.06	1.01

Source: Supplement to the Annual Energy Outlook - 1993
Energy Information Administration
U.S. Department of Energy

Table 2 - 31

Projected Petroleum Products Traffic
(In Thousands of Short Tons)

	Annual Rate of Growth		Projection Years							
Projection Scenario	1990 - 2000	2000 - 2010	1990	2000	2010	2020	2030	2040	2050	2060
IHNC Lock Traffic										
Reference	1.5%	1.0%	6,001	6,963	7,683	8,521	9,497	10,641	12,106	13,571
Oil Price - High	1.1%	0.9%	6,001	6,722	7,338	8,046	8,862	9,806	10,987	12,167
Oil Price - Low	3.4%	1.0%	6,001	8,415	9,311	10,421	11,839	13,736	17,185	20,633
Econ Growth- High	2.1%	0.8%	6,001	7,359	7,964	8,812	9,939	11,398	13,506	15,613
Econ Growth - Low	1.0%	1.2%	6,001	6,607	7,434	8,455	9,728	11,330	13,663	15,995
O/G Recovery-High	1.5%	0.9%	6,001	6,955	7,637	8,427	9,346	10,420	11,786	13,151
O/G Recovery- Low	1.5%	1.0%	6,001	6,982	7,719	8,575	9,573	10,741	12,234	13,727
System Traffic										
Reference	1.1%	0.9%	23,512	26,333	28,794	31,634	34,912	38,696	43,444	48,192
Oil Price - High	2.2%	1.1%	23,512	29,187	32,596	36,857	42,447	50,304	66,443	82,58[illegible]
Oil Price - Low	0.8%	0.8%	23,512	25,536	27,692	30,159	32,984	36,222	40,233	44,[illegible]
Econ Growth- High	1.2%	0.9%	23,512	26,367	28,901	31,811	35,612	39,026	43,863	48,7[illegible]
Econ Growth - Low	1.1%	0.9%	23,512	26,291	28,714	31,489	34,675	38,340	42,903	47,466
O/G Recovery-High	0.8%	0.8%	23,512	25,429	27,580	30,083	33,019	36,489	41,042	45,595
O/G Recovery- Low	1.5%	1.0%	23,512	27,240	30,114	33,605	37,818	42,884	49,573	56,261