only 58 of traffic on this segment of the system in 1990. However, among the remaining commodities on the GIWW-West, industrial chemicals represented over 17 percent of total traffic. In fact, the movement of industrial chemicals on this segment of the GIWW accounted for 37 of all inland movements of this commodity in the United States, reflecting the extensive presence of the petrochemical industry in southern Louisiana and Texas.

Projections of Traffic in Other Commodities

Projections of system traffic for the commodity groups listed in the preceding paragraph were adapted from projections of U.S. inland waterway traffic, by commodity group, that were prepared by a number of public and private agencies and published in the Institute for Water Resources (IWR) report The 1992 Inland Waterway Review. Since the level of traffic among the remaining commodities were minor compared to the groups previously considered, projected traffic for these commodities can be derived through the use of national-level projections. For the exception, industrial chemicals, which showed significant volumes, it was appropriate to use national-level projections since system traffic represented over 37 percent of total U.S. traffic for this commodity. Projected tonnages in these seven groups were made for the years 2000 and 2010. Table 2 - 34 shows both the tonnage estimates and the associated annual growth rates for these commodities. The growth factors corresponding to the annual growth rates displayed in table 2 - 32 were applied to the 1990 base tonnage to yield estimated system tonnage for the same years. For succeeding years, the growth factor associated with the period 2000 to 2010 was carried forward.

Projections of marine shell (a component of the miscellaneous commodity group) was an exception. Over the 1980 to 1990 period, marine shell represented between 3 and 4 percent of system traffic. However, a state regulatory ban on the dredging of clam shell in Lake Pontchartrain and the rapid exhaustion of oyster shell resources in the Atchafalaya Bay will cause waterway traffic to fall to zero by the year 2000. Therefore, tonnage for this commodity group was set to zero over the entire project life. High and low traffic scenarios were prepared for each of the seven commodity groups. The growth factors associated with the scenarios were based on the high and low tonnage projection scenarios that were identified in The 1992 Inland Waterway Review mentioned above. Tonnages and growth rates for the low and high scenarios appear in tables 2 - 33 and 2 - 34, respectively. For marine shell, the preparation of a low scenario was unnecessary. The high scenario for marine shell was based on a more gradual

Table 2 - 32

U.S. Inland Waterway
Commodity Movements

Commodity Group	Commodity Movements (In Millions of Short Tons)			Annual Growth Rate	
	1990	2000	2010	1990 to 2000	2000 to 2010
Farm Products	83.1	102.3	123.5	2.1%	1.9%
Metallic Ores And Products	15.2	13.9	13.5	-0.9%	-0.3%
Non-Metallic Minerals and Products	76.0	79.9	84.0	0.5%	0.5%
Forest Products & Pulp	21.2	24.9	27.0	1.6%	0.8%
Industrial Chemicals	34.7	45.8	54.2	2.8%	1.7%
Agricultural Chemicals	12.9	17.4	20.1	3.0%	1.5%
All Other Commodities Non-Shell	23.2	20.8	22.3	-1.1%	0.7%

Sources: 1. Data Resources (DRI).
2. WEFA Group (formerly Wharton and Chase Econometrics).
3. U.S. Department of Agriculture (USDA).
4. U.S. Department of Energy (DOE).
5. Various trade associations.

Table 2 - 33

U.S. Inland Waterway
Commodity Movements

Low Growth Scenario

Commodity Group	Commodity Movements (In Millions of Short Tons)			Annual Growth Rate	
	1990	2000	2010	1990 to 2000	2000 to 2010
Farm Products	81.6	94.7	109.9	1.5%	1.5%
Metallic Ores And Products	14.1	13.5	12.1	-0.4%	-1.1%
Non-Metallic Minerals and Products	69.9	69.4	71.5	-0.1%	0.3%
Forest Products & Pulp	20.6	22.7	23.3	1.0%	0.3%
Industrial Chemicals	33.3	39.4	43.9	1.7%	1.1%
Agricultural Chemicals	12.3	15.7	16.1	2.5%	0.3%
All Other Commodities Non-Shell	22.0	17.4	15.6	-2.3%	-1.1%

Sources: 1. Data Resources (DRI).
2. WEFA Group (formerly Wharton and Chase Econometrics).
3. U.S. Department of Agriculture (USDA).
4. U.S. Department of Energy (DOE).
5. Various trade associations.

Table 2 - 34

U.S. Inland Waterway
Commodity Movements

High Growth Scenario

Commodity Group	Commodity Movements (In Millions of Short Tons)			Annual Growth Rate	
	1990	2000	2010	1990 to 2000	2000 to 2010
Farm Products	86.9	112.0	135.2	2.6%	1.9%
Metallic Ores And Products	17.2	17.0	16.6	-0.1%	-0.2%
Non-Metallic Minerals and Products	77.5	81.9	86.1	0.6%	0.5%
Forest Products & Pulp	24.4	26.1	29.2	0.7%	1.1%
Industrial Chemicals	35.7	50.3	66.2	3.5%	2.8%
Agricultural Chemicals	14.4	20.1	23.4	3.4%	1.5%
All Other Commodities Non-Shell	24.9	26.7	28.6	0.7%	0.7%

Sources: 1. Data Resources (DRI).
2. WEFA Group (formerly Wharton and Chase Econometrics).
3. U.S. Department of Agriculture (USDA).
4. U.S. Department of Energy (DOE).
5. Various trade associations.

depletion of shell resources, reflected by a 71 percent decline in tonnage from 1990 to 2000 but falling to zero in the year 2010. Under the high scenario, future clam shell traffic originating from Lake Pontchartrain remains zero.

Projections for both system traffic and IHNC lock traffic under the base case and under the high and low scenarios for the seven commodity groups are presented in table 2 - 35. Tonnage projections for marine shell by year and scenario for the lock and the system are presented in table 2 - 36.

PROJECTIONS OF COMBINED TONNAGE

Tonnage estimates for total IHNC lock traffic for each of the projection years under the Reference Case were prepared by summing the projected tonnages for all commodity groups. These totals appear in table 2 - 37. [Note: Specific tonnage estimates for this and successive tables were generated in other than a spreadsheet environment and may differ from those presented in earlier tables due to the cumulative effects of rounding.]

Projections of total IHNC lock traffic for low and high scenarios were compiled in a similar manner. For coal, crude petroleum and petroleum projects, the low and high scenario tonnages were defined as the lowest and highest tonnages prevailing among the six scenarios constructed by the DOE. The lowest traffic levels for coal, crude petroleum and petroleum products are suggested by DOE's High Oil and Gas Recovery Case, Low World Oil Price Case and High World Oil Price Case, respectively. The highest traffic levels for coal, crude petroleum and petroleum products are represented by DOE's Low Oil and Gas Recovery Case, High World Oil Price Case and Low World Oil Price Case, respectively.

For the remaining commodity groups, the low and high scenario tonnages correspond to the low and high scenarios that were defined in The 1992 Inland Waterway Review. Total lock tonnages by year under the low scenario is presented in table 2 - 38. Total lock tonnage by year under the high scenario appears in table 2 - 39.

Projections of total system traffic under the Reference Case and low and high scenarios were prepared in an identical manner to those for IHNC Lock traffic. Table 2 - 40 summarizes baseline system traffic. Table 2 - 41 presents system traffic under the low scenario while table 2 - 42 describes system tonnage under the high scenario. Table 2 - 43 summarizes the average annual growth rates for total IHNC Lock tonnage in addition to those for individual

Table 2 - 35

Projected Traffic in Other Commodities

Projection Scenario	Projection Years								Growth Factors	
	1990	2000	2010	2020	2030	2040	2050	2060	1990 - 2000	2000 - 2010
IHNC LOCK TRAFFIC	(In Thousands of Short Tons)									
Baseline										
Farm Products	560	689	832	1005	1213	1464	1768	2134	1.23	1.21
Metallic Ores & Mins.	1420	1299	1261	1225	1190	1155	1122	1090	0.91	0.97
Non-Metallic Mins.	2075	2181	2293	2411	2535	2665	2802	2945	1.05	1.05
Forest Products	179	210	228	247	268	291	315	342	1.17	1.08
Industrial Chemicals	1920	2534	2999	3549	4200	4970	5882	6960	1.32	1.18
Agricultural Chemicals	501	676	781	902	1042	1203	1390	1606	1.35	1.16
All Other (Non-Shell)	202	181	194	208	223	239	257	275	0.90	1.07
Low										
Farm Products	560	650	754	875	1016	1179	1368	1588	1.16	1.16
Metallic Ores & Mins.	1420	1360	1219	1092	979	877	786	705	0.96	0.90
Non-Metallic Mins.	2075	2060	2122	2187	2253	2321	2391	2464	0.99	1.03
Forest Products	179	197	202	208	213	219	225	231	1.10	1.03
Industrial Chemicals	1920	2272	2531	2820	3142	3501	3901	4347	1.18	1.11
Agricultural Chemicals	501	639	656	672	690	707	725	744	1.28	1.03
All Other (Non-Shell)	202	160	143	128	115	103	93	83	0.79	0.90
High										
Farm Products	560	722	871	1052	1270	1533	1850	2233	1.29	1.21
Metallic Ores & Mins.	1420	1403	1370	1338	1307	1276	1246	1217	0.99	0.98
Non-Metallic Mins.	2075	2193	2305	2423	2548	2678	2816	2960	1.06	1.05
Forest Products	179	191	214	240	268	300	336	375	1.07	1.12
Industrial Chemicals	1920	2705	3560	4686	6167	8116	10682	14059	1.41	1.32
Agricultural Chemicals	501	699	814	948	1103	1285	1495	1741	1.40	1.16
All Other (Non-Shell)	202	217	232	249	266	285	305	327	1.07	1.07
SYSTEM TRAFFIC										
Baseline										
Farm Products	2,368	2,915	3,519	4,249	5,129	6,192	7,475	9,024	1.23	1.21
Metallic Ores & Mins.	5,153	4,712	4,577	4,445	4,317	4,193	4,072	3,955	0.91	0.97
Non-Metallic Mins.	12,088	12,708	13,360	14,046	14,767	15,525	16,321	17,159	1.05	1.05
Forest Products	244	287	311	337	365	396	430	466	1.17	1.08
Industrial Chemicals	11,830	15,614	18,478	21,867	25,877	30,624	36,240	42,887	1.32	1.18
Agricultural Chemicals	2,777	3,746	4,327	4,998	5,774	6,670	7,705	8,901	1.35	1.16
All Other (Non-Shell)	1,060	950	1,019	1,092	1,171	1,256	1,346	1,443	0.90	1.07
Low										
Farm Products	2,368	2,748	3,189	3,701	4,295	4,985	5,785	6,713	1.16	1.16
Metallic Ores & Mins.	5,153	4,934	4,422	3,963	3,552	3,184	2,854	2,558	0.96	0.90
Non-Metallic Mins.	12,088	12,002	12,365	12,739	13,124	13,521	13,931	14,352	0.99	1.03
Forest Products	244	269	276	283	291	298	306	314	1.10	1.03
Industrial Chemicals	11,830	13,997	15,596	17,377	19,362	21,573	24,037	26,782	1.18	1.11
Agricultural Chemicals	2,777	3,545	3,635	3,728	3,823	3,920	4,020	4,122	1.28	1.03
All Other (Non-Shell)	1,060	838	752	674	604	542	486	435	0.79	0.90
High										
Farm Products	2,368	3,052	3,684	4,447	5,369	6,481	7,823	9,443	1.29	1.21
Metallic Ores & Mins.	5,153	5,093	4,973	4,856	4,742	4,630	4,521	4,415	0.99	0.98
Non-Metallic Mins.	12,088	12,774	13,429	14,118	14,842	15,603	16,403	17,245	1.06	1.05
Forest Products	244	261	292	327	365	409	457	512	1.07	1.12
Industrial Chemicals	11,830	16,668	21,937	28,871	37,997	50,009	65,816	86,621	1.41	1.32
Agricultural Chemicals	2,777	3,876	4,513	5,254	6,116	7,120	8,289	9,650	1.40	1.16
All Other (Non-Shell)	1,060	1,137	1,218	1,304	1,397	1,496	1,603	1,717	1.07	1.07

Table 2 - 36

Projected Traffic Growth
(In Thousands of Short Tons)

Traffic in Marine Shell

Commodity Group	Projection Years							
	1990	2000	2010	2020	2030	2040	2050	2060
IHNC Lock Traffic								
Reference	346	0	0	0	0	0	0	0
Low	346	0	0	0	0	0	0	0
High	346	100	0	0	0	0	0	0
System Traffic								
Reference	762	0	0	0	0	0	0	0
Low	762	0	0	0	0	0	0	0
High	762	221	0	0	0	0	0	0

Table 2 - 37

Projected Traffic Growth
(In Thousands of Short Tons)

IHNC Lock Traffic

Reference Case

Commodity Group	Projection Years							
	1990	2000	2010	2020	2030	2040	2050	2060
Farm Products	560	689	832	1,005	1,213	1,464	1,768	2,134
Metallic Ores & Mins.	1,420	1,299	1,261	1,225	1,190	1,155	1,122	1,090
Coal	7,999	10,308	11,987	13,940	16,210	18,850	21,920	25,491
Crude	2,291	1,578	2,024	1,902	1,787	1,680	1,579	1,484
Non-Metallic Mins.	2,075	2,181	2,293	2,411	2,535	2,665	2,802	2,945
Forest Products	179	210	228	247	268	291	315	342
Industrial Chemicals	1,920	2,534	2,999	3,549	4,200	4,970	5,882	6,960
Agricultural Chemicals	501	676	781	902	1,042	1,203	1,390	1,606
Petroleum Products	6,001	6,963	7,683	8,521	9,497	10,641	12,106	13,571
Miscellaneous	548	181	194	208	223	239	257	27[illegible]
Total	23,494	26,619	30,282	33,910	38,165	43,158	49,141	55,898

Table 2 - 38

Projected Traffic Growth
(In Thousands of Short Tons)

IHNC Lock Traffic

Low Scenario

Commodity Group	Projection Years							
	1990	2000	2010	2020	2030	2040	2050	2060
Farm Products	560	650	754	875	1,016	1,179	1,368	1,588
Metallic Ores & Mins.	1,420	1,360	1,219	1,092	979	877	786	705
Coal	7,999	8,199	9,554	11,132	12,971	15,114	17,611	20,521
Crude	2,291	1,068	1,468	1,175	941	753	603	482
Non-Metallic Mins.	2,075	2,060	2,122	2,187	2,253	2,321	2,391	2,464
Forest Products	179	197	202	208	213	219	225	231
Industrial Chemicals	1,920	2,272	2,531	2,820	3,142	3,501	3,901	4,347
Agricultural Chemicals	501	639	656	672	690	707	725	744
Petroleum Products	6,001	6,722	7,338	8,046	8,862	9,806	10,987	12,167
Miscellaneous	548	160	143	128	115	103	93	83
Total	23,493	23,327	25,987	28,335	31,182	34,580	38,690	43,332

Table 2 - 39

Projected Traffic Growth
(In Thousands of Short Tons)

IHNC Lock Traffic

High Scenario

Commodity Group	Projection Years							
	1990	2000	2010	2020	2030	2040	2050	2060
Farm Products	560	722	871	1,052	1,270	1,533	1,850	2,233
Metallic Ores & Mins.	1,420	1,403	1,370	1,338	1,307	1,276	1,246	1,217
Coal	7,999	10,320	12,535	15,225	18,491	22,459	27,279	33,132
Crude	2,291	1,869	2,314	2,326	2,338	2,350	2,362	2,374
Non-Metallic Mins.	2,075	2,193	2,305	2,423	2,548	2,678	2,816	2,960
Forest Products	179	191	214	240	268	300	336	375
Industrial Chemicals	1,920	2,705	3,560	4,686	6,167	8,116	10,682	14,059
Agricultural Chemicals	501	699	814	948	1,103	1,285	1,495	1,741
Petroleum Products	6,001	8,415	9,311	10,421	11,839	13,736	17,185	20,633
Miscellaneous	548	317	232	249	266	285	305	327
Total	23,493	28,835	33,526	38,908	45,597	54,018	65,556	79,051

Table 2 - 40

Projected Traffic Growth
(In Thousands of Short Tons)

System Traffic

Reference Case

Commodity Group	Projection Years							
	1990	2000	2010	2020	2030	2040	2050	2060
Farm Products	2,368	2,915	3,519	4,249	5,129	6,192	7,475	9,024
Metallic Ores & Mins.	5,153	4,712	4,577	4,445	4,317	4,193	4,072	3,955
Coal	8,522	10,993	12,862	15,049	17,607	20,600	24,411	28,222
Crude	15,286	10,532	13,502	12,690	11,926	11,209	10,535	9,901
Non-Metallic Mins.	12,088	12,708	13,360	14,046	14,767	15,525	16,321	17,159
Forest Products	244	287	311	337	365	396	430	466
Industrial Chemicals	11,830	15,614	18,478	21,867	25,877	30,624	36,240	42,887
Agricultural Chemicals	2,777	3,746	4,327	4,998	5,774	6,670	7,705	8,901
Petroleum Products	23,512	26,333	28,794	31,634	34,912	38,696	43,444	48,192
Miscellaneous	1,822	950	1,019	1,092	1,171	1,256	1,346	1,443
Total	83,602	88,790	100,749	110,407	121,845	135,360	151,979	170,149

Table 2 - 41

Projected Traffic Growth
(In Thousands of Short Tons)

System Traffic

Low Scenario

Commodity Group	Projection Years							
	1990	2000	2010	2020	2030	2040	2050	2060
Farm Products	2,368	3,052	3,684	4,447	5,369	6,481	7,823	9,443
Metallic Ores & Mins.	5,153	4,934	4,422	3,963	3,552	3,184	2,854	2,558
Coal	8,522	8,897	10,415	12,192	14,272	16,706	19,807	22,908
Crude	15,286	7,123	9,795	7,840	6,276	5,024	4,021	3,219
Non-Metallic Mins.	12,088	12,002	12,365	12,739	13,124	13,521	13,931	14,352
Forest Products	244	269	276	283	291	298	306	314
Industrial Chemicals	11,830	13,997	15,596	17,377	19,362	21,573	24,037	26,782
Agricultural Chemicals	2,777	3,545	3,635	3,728	3,823	3,920	4,020	4,122
Petroleum Products	23,512	25,536	27,692	30,159	32,984	36,222	40,233	44,243
Miscellaneous	1,822	838	752	674	604	542	486	435
Total	83,602	80,193	88,632	93,402	99,657	107,471	117,518	128,376

Table 2 - 42

Projected Traffic Growth
(In Thousands of Short Tons)

System Traffic

High Scenario

Commodity Group	Projection Years							
	1990	2000	2010	2020	2030	2040	2050	2060
Farm Products	2,368	3,052	3,684	4,447	5,369	6,481	7,823	9,443
Metallic Ores & Mins.	5,153	5,093	4,973	4,856	4,742	4,630	4,521	4,415
Coal	8,522	11,078	13,405	16,220	19,626	23,748	29,210	34,672
Crude	15,286	12,473	15,442	15,521	15,600	15,679	15,759	15,839
Non-Metallic Mins.	12,088	12,774	13,429	14,118	14,842	15,603	16,403	17,245
Forest Products	244	261	292	327	365	409	457	512
Industrial Chemicals	11,830	16,668	21,937	28,871	37,997	50,009	65,816	86,621
Agricultural Chemicals	2,777	3,876	4,513	5,254	6,116	7,120	8,289	9,650
Petroleum Products	23,512	29,187	32,596	36,857	42,447	50,304	66,443	82,582
Miscellaneous	1,822	1,358	1,218	1,304	1,397	1,496	1,603	1,717
Total	83,602	95,820	111,489	127,775	148,501	175,479	216,324	262,696

Table 2-43

Summary of Annual Commodity Growth Rates
By Projection Scenario

IHNC Lock

Group	Low		Mid		High	
	1990 to 2000	2000 to 2010	1990 to 2000	2000 to 2010	1990 to 2000	2000 to 2010
Farm Products	1.5%	1.5%	2.1%	1.9%	2.6%	1.9%
Metallic Ores & Mins.	-0.4%	-1.1%	-0.9%	-0.3%	-0.1%	-0.2%
Coal	0.2%	1.5%	2.6%	1.5%	2.6%	2.0%
Crude	-7.3%	3.2%	-3.7%	2.5%	-2.0%	2.2%
Non-Metallic Mins.	-0.1%	0.3%	0.5%	0.5%	0.6%	0.5%
Forest Products	1.0%	0.3%	1.6%	0.8%	0.7%	1.1%
Industrial Chemicals	1.7%	1.1%	2.8%	1.7%	3.5%	2.8%
Agricultural Chemicals	2.5%	0.3%	3.0%	1.5%	3.4%	1.5%
Petroleum Products	1.1%	0.9%	1.5%	1.0%	3.4%	1.0%
Miscellaneous	-11.6%	-1.1%	-10.5%	0.7%	-5.3%	-3.1%
Total Tonnage	-0.1%	1.1%	1.3%	1.3%	2.1%	1.5%

commodity groups. These average annual growth rates are also presented by growth scenario. For system traffic, the average annual growth rates for each commodity group is identical to those for the IHNC Lock, with the exception of petroleum products (see table 2 - 31 for a comparison).

PROJECTED DEEP-DRAFT TRAFFIC

OVERVIEW

As previously indicated, not all deep-draft traffic desirous of lock service can be accommodated by the existing lock. Table 2 - 44 identifies the total, or unconstrained, existing deep-draft lockage demand. The derivation of this demand will be detailed in Section 8 of this appendix.

Future unconstrained lockage demand has been developed directly from the estimate of existing unconstrained lockage demand. Existing unconstrained lockage demand has been used as a base, with future unconstrained demand calculated by applying a growth factor to the existing level. As a result, future deep-draft lockages have been estimated directly from the number of existing vessels demanding lockage. Vessel trips and not tons were used as the initial basis of demand projections for several reasons.

The tonnage actually moving through the existing lock in deep-draft vessels is quite low, making the relationship between tonnage and actual lockages less direct. Vessels are typically light-loaded or even empty, having discharged cargo in one section of the port before transiting the lock to reach the other section. This accounts for the low load-to-capacity utilization for locking vessels. Low utilization is also reflected in the unaccommodated portion of existing demand.

The subset of vessels that demand lockage is not a representative cross-section of the overall population of vessels calling at the port. Projecting total port throughput (tonnage) and then converting tonnage to vessel trips is not the most direct or the most accurate way to evaluate this subset of traffic. Because the subset is only a very small portion of the total port traffic, overall trends for the port could easily obscure any trends associated with the smaller subset. Another consideration for not projecting tonnage as an initial step in projecting lock demand is that a significant portion of MR-GO traffic and vessels demanding lockage are ultimately associated with the Mexican/Caribbean/ Central American trade. Small volume and restrictive channel drafts at the foreign end

Table 2 - 44

Unconstrained Deep-Draft Lockage Demand
Lockages by Vessel Type and Deadweight Tonnage
(1991)

Deadweight Tonnage (1,000)	Dry Bulk	General Cargo	Container	Total
3	0	110	0	110
3-10	1	3	0	4
10-20	4	20	2	26
20-30	16	0	23	39
30-40	20	0	3	23
40-50	4	0	0	4
	45	133	28	206

typify many of the ports associated with this trade. As a result, the potential for changes in the fleet that makes up lockage demand will be minimized as the future deep-draft vessel demand for lockage services is likely to continue to be composed of relatively small vessels.

SCENARIO DESCRIPTION

Three separate lockage demand projections, representing low, mid and high scenarios, were developed. These scenarios made use of historical MR-GO and IHNC Lock traffic trends along with econometric studies designed to estimate the future volume of U.S. oceanborne trade. Each scenario was developed and evaluated as a distinctly separate condition, but was constructed with each of the other scenarios in mind, with the explicit intent of covering the reasonable range of possible outcomes.

Projections of U.S. oceanborne trade contained in the 1987 Maritime Administration (MARAD) publication, Forecasting Trade and the Merchant Fleet were reviewed. These projections represent a general indicator of the potential growth in deep-draft activity. This MARAD study drew significantly from the econometric study, Assessment of Maritime Trade and Technology, conducted by Wharton Econometrics for the Office of Technology Assessment. The annual compound growth rates for U.S. oceanborne trade projected in the Wharton study are summarized in table 2 - 45. The Wharton study projected trade by major commodity type (general cargo, dry bulk, and liquids) and foreign trade area (e.g. Latin America, Northern Europe). The summary provided in table 2 - 45 displays the projected compound annual growth rates by major commodity type for each of the individual trading areas and an overall composite for all trading areas.

The relevance of the projected growth rate for any particular trading area to IHNC Lock deep-draft demand is best reflected by the distribution of trading area traffic proportions for the MR-GO. Latin America (Caribbean and South America) represents the single largest aggregate trading area for MR-GO deep-draft traffic accounting for approximately 35 percent of total volume in 1991. Europe and Asia represent the next largest areas accounting for 29 and 14 percent, respectively. In aggregate these three regions account for approximately 78 percent of total MR-GO deep-draft traffic. The MR-GO weighted average composite growth rate that is produced by using the 1991 MR-GO relative trading region traffic shares and the 1990 to 2000 trading region projected growth rates is approximately 3.5 percent.

Table 2 - 45
U.S. Oceanborne Trade
Annual Compound Growth Rates

Trade Region	General Cargo Imports		Dry Bulk Exports		Liquids Imports		Total	
	1985-1990	1990-2000	1985-1990	1990-2000	1985-1990	1990-2000	1990-2000	1990-2000
Japan	3.5	3.1	5.4	3.5	0.0	0.0	5.3	3.7
South Asia	4.3	7.1	7.2	7.2	2.1	2.0	5.5	6.1
C.P. Asia	-9.7	5.2	1.2	2.4	0.0	0.0	1.3	2.4
Oceania	0.0	2.3	1.5	0.4	-	1.5	2.8	2.5
U.K./N. Europe	3.7	2.1	1.9	2.3	3.1	2.6	2.7	2.5
Other Europe	5.1	2.8	3.0	3.3	4.8	3.6	3.3	3.3
Latin America	3.1	2.5	6.0	5.9	1.4	1.2	3.2	3.5
Middle East	2.9	2.0	5.8	5.9	1.4	1.2	2.9	3.1
Africa	3.7	2.5	5.2	5.3	1.5	1.2	2.6	2.6
Overall	4.8	3.3	4.6	4.5	1.8	1.6	3.6	3.6

Source: Wharton Econometrics

In conjunction with the econometric study, trends in MR-GO traffic volume and IHNC Lock deep-draft vessel lockages were analyzed. Over the last ten years of record, 1983-1992, MR-GO deep-draft tonnage has increased from 4.1 million tons in 1983 to 5.1 million tons in 1992. However, the average for the period was approximately 5.5 million tons annually with no discernible trend. Over the same period, deep-draft lockages through IHNC Lock have declined from 195 to 156 while averaging approximately 169 lockages per year. While statistically significant at a high degree of confidence (95 percent), the trend line does a modest job of predicting lockages, explaining slightly less than 50 percent of year to year fluctuations.

Because the growth patterns suggested by the econometric study are not supported by recent MR-GO or IHNC deep-draft traffic activity, the econometric study results were viewed as inappropriate to represent a mid or most probable scenario. However, given the long term requirement of the projection process and the prior periods of sustained significant MR-GO growth, the econometric study results do represent, at a minimum, a legitimate upper bound estimate of the potential for future MR-GO\IHNC traffic. As such, the growth projected in the econometric study was selected to represent the high growth traffic scenario.

The specific value selected to represent the high growth scenario was the 1990 to 2000 overall composite rate for all trade regions. Given the similarity of the MR-GO weighted average rate (3.5 percent) with the econometric model composite average for all trading regions (3.6 percent), the single composite average for all regions was selected for use with all MR-GO traffic. This rate was held constant throughout the projection period.

Determination of the reasonable lower bound traffic activity, representing the low growth scenario, was considered next. Selection of the low growth rate(s) were significantly influenced by recent historical traffic. Past volume in deep-draft vessel lockages at the IHNC Lock has showed a modest, but statistically significant decline over the last 10 years, while MR-GO deep-draft tonnage has shown no statistically significant trend over the period. Continuation of the recent no growth historical pattern was selected to represent the low growth scenario. As such, future activity was held constant at current 1991 levels throughout the projection period.

Taking the midpoint growth rate between the high and low growth scenarios produced a annual growth rate of 1.8 percent. This midpoint rate of 1.8 percent was used to

represent the mid growth scenario and was held constant throughout the projection period.

Table 2 - 46 summarizes the compound annual growth rates associated with each scenario. As previously stated each scenario makes use of a constant rate throughout the duration of the projection period.

PROJECTED UNCONSTRAINED LOCKAGE DEMAND

Application of the mid growth scenario rates to the existing unconstrained lockage demand (displayed in table 2 - 44) produces the projected future unconstrained lockage demand. These values are presented in table 2 - 47. The projected values are displayed by vessel type and size in ten year increments over the projection period. Tables 2 - 48 and 2 - 49 display the same information for the low and high growth scenarios, respectively. Table 2 - 50 aggregates total unconstrained lockage demand for all vessel types and sizes by year for each of the growth scenarios.

Table 2 - 46

Unconstrained Deep-Draft Lockage Demand
Annual Compound Growth Rates
Scenario Summary

Period	Low	Mid	High
1991-2000	0.0	1.8	3.6
2000-2060	0.0	1.8	3.6
1991-2060	0.0	1.8	3.6

Table 2 - 47

Unconstrained Projected Deep-Draft Lockage Demand
Lockages by Vessel Type and Deadweight Tonnage
(Mid Growth)

DWT (1,000)	1991	2000	2010	2020	2030	2040	2060
Dry Bulk:							
0-10	1	1	1	2	2	2	3
10-20	4	5	6	7	8	10	14
20-30	16	19	23	27	32	38	55
30-40	20	24	28	34	40	48	69
40-50	4	5	6	7	8	10	14
Total	45	54	64	77	90	108	155
General Cargo:							
3	110	129	154	184	220	263	376
3-10	3	4	4	5	6	7	10
10-20	20	24	28	34	40	48	69
Total	133	157	186	223	266	318	455
Containers:							
0-10	0	0	0	0	0	0	0
10-20	2	3	3	4	5	6	8
20-30	23	27	32	39	46	55	79
30-40	3	4	4	5	6	7	10
Total	28	34	39	48	57	68	97

Table 2 - 48

Unconstrained Projected Deep-Draft Lockage Demand
Lockages by Vessel Type and Deadweight Tonnage
(Low Growth)

DWT (1,000)	1991	2000	2010	2020	2030	2040	2060
Dry Bulk:							
0-10	1	1	1	1	1	1	1
10-20	4	4	4	4	4	4	4
20-30	16	16	16	16	16	16	16
30-40	20	20	20	20	20	20	20
40-50	4	4	4	4	4	4	4
Total	45	45	45	45	45	45	45
General Cargo:							
3	110	110	110	110	110	110	110
3-10	3	3	3	3	3	3	3
10-20	20	20	20	20	20	20	20
Total	133	133	133	133	133	133	133
Containers:							
0-10	0	0	0	0	0	0	0
10-20	2	2	2	2	2	2	2
20-30	23	23	23	23	23	23	23
30-40	3	3	3	3	3	3	3
Total	28	28	28	28	28	28	28

Table 2 - 50

Unconstrained Projected Deep-Draft Lockage Demand
Total Lockages
Scenario Summary

Scenario	1991	2000	2010	2020	2030	2040	2060
Low	206	206	206	206	206	206	206
Mid	206	245	289	348	413	494	707
High	206	285	404	576	820	1169	2371

Table 2 - 49

Unconstrained Projected Deep-Draft Lockage Demand
Lockages by Vessel Type and Deadweight Tonnage
(High Growth)

DWT (1,000)	1991	2000	2010	2020	2030	2040	2060
Dry Bulk:							
0-10	1	1	2	3	4	6	12
10-20	4	6	8	11	16	23	46
20-30	16	22	31	45	64	91	184
30-40	20	28	39	56	79	113	230
40-50	4	6	8	11	16	23	46
Total	45	63	88	126	179	256	518
General Cargo:							
3	110	151	215	307	437	622	1263
3-10	3	4	6	8	12	17	34
10-20	20	28	39	56	79	113	230
Total	133	183	260	371	528	752	1527
Containers:							
0-10	0	0	0	0	0	0	0
10-20	2	3	5	7	10	14	28
20-30	23	32	45	64	91	130	264
30-40	3	4	6	8	12	17	34
Total	28	39	56	79	113	161	326