TRANSPORTATION RATE ANALYSIS

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I. SUMMARY

Based on a 1,353 movement survey of barge shipping, users of the Upper Mississippi River-Illinois Waterway Navigation System are estimated to have saved, on average, more than $21.46 per ton in transportation and handling charges for the movement of millions of tons of cargo when available barge costs are compared to the next-best, all-land transportation alternative. These savings are calculated across 12 commodity groups including 96 separate commodities, and range between a high of $48.59 per ton for industrial chemicals to $5.23 per ton for aggregates. A full reporting of all rate calculations is provided through a combination of spreadsheets and worksheets in Volume II.

II. INTRODUCTION

This study was conducted by the Tennessee Valley Authority (TVA) under contract with the Rock Island District of the U.S. Army Corps of Engineers (Corps) in order to facilitate the calculations of the National Economic Development (NED) benefits attributable to Upper Mississippi River navigation. Toward this objective, the study provides a full range of transportation rates and supplemental costs for a sampling of 1353 movements contained in the 2004 waterborne commodity movements which, in total or in part, were routed on the Upper Mississippi River-Illinois Waterway Navigation System.

Freight rates for each sample movement were calculated based on the actual water-inclusive routing, as well as for a competing all-land alternative. All computations reflect those rates and fees which were in effect in June 2006. Results are documented on a movement-by-movement basis, including a separate worksheet for each observation. These disaggregated data are also integrated into individual spreadsheets for each of the eight commodity groupings. A full description of the

study's scope and guidelines, TVA's methods of rate research and construction, and supporting assumptions is provided below.

III. Study Parameters

A sample of 1,353 movements was identified for inclusion in this analysis. Dock-to-dock tonnage for the origin-destination pairs ranged from 665 tons of electrical machinery to 1,050,830 tons of crushed stone, with 96 individual commodities represented. The sample tonnage used in the study comprised 76% of the total tons shipped on the named waterways in 2004. The sample was drawn from the 2004 WCSC movements that originated or terminated on the Upper Mississippi River above Lock and Dam 27, excluding the Missouri River, unless there was an origin or destination in the study area. Further, the sample included movements that originated or terminated on the Illinois Waterway below Lockport, IL or originated or terminated in the Greater Chicago or Great Lakes area and passed through Lockport, IL. The sample was constrained to include movements from each of the four river reaches in the study area, as well as the inclusion of movements from each Corps of Engineers commodity group. Reported rates for both the water movement and the all-land alternative are based on the actual or true location of shipment origins and destinations, and include the off-river leg rate information.

1. *Water Routings*

Because many of the sample movements have off-river origins and/or destinations, a full accounting of *all* transportation costs for waterborne movements requires the calculation of railroad and/or motor carrier rates for movement to or from the nearest appropriate port facility. Additionally, all calculations reflect the loading and unloading costs at origin and destination, all transfer costs to or from barge, and any fees or charges associated with the transportation requirements. Finally, though it was rarely a concern, all waterborne routings were constrained to include at least partial use of the Upper Mississippi River-Illinois Waterway navigation system.

2. *Land Routes*

With the exception of over-sized shipments and intra-pool sand dredging, rail or truck rates are calculated for all movements (See Section VI for a discussion of exceptions.). For over-dimension truck and intra-pool dredged materials, the land rate was estimated as compared to a specific modeled rate using standardized, identifiable, data inputs. As in the case of the barge-inclusive routings, many all-land routes require the use of more than one transport mode. Therefore, when appropriate, calculations include all requisite transfer charges.

3. St. Louis Option

The St. Louis Option represents the alternative of moving cargos by barge to or from the greater St Louis area, then trans-loading and moving said cargos by overland mode to or from points above St Louis. If a shipment originated or terminated in the greater St. Louis area, no St Louis trans-load option was provided. The dock selected for preparing this transportation option is one that is currently equipped to accommodate the commodity. As an example, petroleum products were assumed to be trans-loaded at one of the existing rail or truck served tank farms in the Wood River or Hartford, IL area; likewise, dry bulk products were assumed to be trans-loaded in either St. Louis, MO or East St. Louis, IL depending upon the rail carrier used in the overland routing.

4. Seasonality and Market Anomalies

To accurately reflect NED benefits, it is necessary to develop rates which portray the normal market conditions which are anticipated over the project life. For this reason, every attempt was made to purge the data of anomalous or transitory influences. As a part of all shipper surveys and interviews conducted, respondents were directed to ignore temporary market disruptions and provide information reflective of “normal” operating conditions. In order to provide a comprehensive

analysis of rates, seasonal rates for grain and grain products were computed using a quarterly average barge rate. Also to address the issue of the difference rates in the year of the sample compared to the most recent year rates, annual 2004 barges were presented as an alternative for grain and grain products. Annual contract barge rates with a fuel escalation feature and five-year average spot market grain rates provide an annual average barge rate that is comparable to the multi year contract rail rates that remove seasonality. The result is consistent rate treatment for each mode.

When comparing the Upper Mississippi River 1996 Rate Study to the current study, four notable situations emerge in respect to long-term cost efficiencies for the rail mode of transportation. First, rail mergers prior to the 1996 through 2000 time period have been completed. The result of these mergers is a decrease in the variable cost of the surviving carrier and an increase in revenue margins that reflect the surviving carrier's rate market power. In addition, with the reduced competition, railroads can now "de-market" service and escalate price. Second, the Class 1 rail carriers continue to deploy larger rail cars and install heavier rail track capacity. Lading weights in excess of 120 tons for coal and grains frequently occur, as do unit trains in excess of 135 cars, reducing unit costs by seven to ten percent compared to the traditional 100 ton capacity rail cars. Third, the decline in volume in the export coal market has forced rail carriers to reduce coal pricing to selected export locations to maintain the viability of railroad-owned transfer docks and terminals. An additional part of the railroad coal strategy is the development of rate structures that favor annual twelve month equipment utilization as compared to nine month car utilization that trans-load to barges for trips on the Upper Mississippi. Fourth, railroad capacity in terms of track, terminals and car availability has reached critical congestion at many points in the rail network, especially the East/West corridors that handle unit train shipping of containers and western coal.

IV. WORKSHEET EXPLANATION

Volume II contains the individual worksheets for each of the 1,353 movements. Each worksheet consists of 1 - 4 pages and catalogues basic shipment information including:

1) Assigned shipment reference number
2) Individual commodity description
3) Average reported travel time
4) River origin and zip code
5) River origin waterway mile
6) Off-river origin (if applicable)
7) WCSC number
8) Shipment tonnage
9) River destination and zip code
10) River destination waterway mile
11) Off-river destination (if applicable)

Section I of the rate worksheet contains the analysis of the barge-inclusive routing from origin to destination via the Upper Mississippi River-Illinois Waterway Navigation System. Section II contains information describing the available all overland land alternative. Alternative 1 contains an analysis of the potential barge movement via trans-loading at St Louis.[1] Alternative 2 contains rates for the potential movement of export grains to the Pacific Northwest. Alternatives 3-6 contain the seasonal quarterly rates for grains and grain products. And, Alternative 7 contains the average 2004 barge rates for grain and grain products (See Appendix 1 for a sample Rate Sheet).

Authorities or sources for all calculations are reported in footnotes to the appropriate worksheet items. All rates and supplemental costs are expressed on a per net ton basis in second quarter 2006 U.S. dollars. When the river port town name and the railroad station name are different, the railroad station name is indicated as an off-river origin or destination with no cost to and/or from the river.

V. Judgments and Assumptions

Based on information collected from shippers, receivers, carriers, river terminal operators, stevedores, other federal agencies, and private trade associations, TVA was able to identify probable origins and destinations for the majority of those movements that originated or terminated at off-river locations. In the absence of specific shipper/receiver information, it is assumed that the river origin and destination are the respective originating and terminating points for both river and alternative modes of transportation. In every case, an attempt was made to gather information from all shipping ports. However, in some instances, 2004 logistical data are not available from these ports. In a few cases, terminal representatives declined to provide the requested information.

Specific commodity groups are discussed in more detail later in this section. However, for those movements that originate or terminate at a river port location, it is assumed that rail service could also be utilized by the shipper or receiver if that terminal is rail served. Exceptions to this assumption are noted on individual worksheets. When the shipper or receiver is served by truck only, a railroad team track or transfer facility at the station nearest the off-river shipper or receiver is used for the land alternative. Only those shippers who ship more than 200,000 tons annually and who are adjacent to rail tracks would be assumed to undertake the significant capital expenditures necessary to acquire direct rail service. No consideration is given to private car leasing costs and mileage allowances made by carriers to shippers for the use of private equipment are also ignored.

For the long run, in all cases, it is assumed that the alternative modes of transportation would have the physical capacity to accommodate the additional tonnage represented by each commodity movement (This is provided for in the Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (P&G)). Commodity specific judgments and assumptions include:

Coal

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[1] The St Louis option

A number of assumptions are made for land haul rates for the movements of coal to utility destinations that are not rail served. Volumes to these destinations are, in many cases, substantial, so that long-haul truck transportation cannot be considered a viable option. In the absence of water transportation, receiving utilities would have to carefully evaluate those available options which might ensure their ability to continue to receive large volumes of coal. These considerations might include the replacement cost of transfer and handling facilities, the construction cost of switch or main line rail track, the cost of new or improved highway access, the economies of buying or leasing rail equipment, and the possibility of shifting origins to assure adequate coal supply. For their part, we may assume that rail carriers would be willing to construct additional track capacity if volumes are sufficient. However, these construction costs would most likely be passed on to the shipper via higher rates.

To accommodate those instances in which sample barge movements are to non-rail served utilities, we have incorporated the following judgments and assumptions.

> If the receiving utility is not rail served, rates are applied to the nearest railhead and trucking costs from the railhead to the destination are applied. If the shipping point is not rail served, a motor carrier charge is applied from the mine origin to the nearest railhead. It is assumed that transfer facilities would be available at both origin and destination for transfer between rail and truck.
>
> If the receiving utility is rail served for supplies only, but not coal, the rail car unloading cost of the utility is inflated to accommodate an on-site truck shuttle to the coal stockpile.
>
> In some instances, movements involve a truck haul from multiple origins to a concentration or preparation point for loading to rail. In these instances, where shipments originate at several mines within the same general area, a representative rail origin is selected as the transfer location.

Aggregates

Land haul rates on limestone and sand and gravel reflect the modes necessary to transport the shipments from actual origins to actual destinations. If origins or destinations are not rail served, a trucking charge is applied from the nearest rail station. For those movements where both rail and

truck transportation are an option, truck hauls are limited to a distance of 250 miles. This, on occasion results in slightly higher rates. However, it was deemed impractical, in the absence of water transportation, to transport large volumes of these commodities for long distances by truck. Limiting factors of truck transport include lower cargo carrying capacity, the inability to round-trip more than two times per day, and the absence of loaded back-haul opportunities.

With regard to waterway improvement materials, we assume that land movements would require a truck haul at the destination for delivery to river bank work locations. These truck movements would likely average ten miles each. It should be noted that a significant amount of channel improvement and bank stabilization work is conducted off shore or at locations without highway access, making land transportation impractical.

Grain

The computation of rates for grain is based upon the survey responses of the shippers and receivers. Specifically, if a country elevator gathers grain and then ships the grain to the river terminal, we assume a 20 mile truck haul from the farmer's field to the country elevator. In contrast, if the river terminal states that more than 60% of the grain comes from the farm or on farm storage, the use of country elevators is excluded from consideration. If the grain moves for export, a unit train movement is assumed, and land rates are computed from a unit train capacity elevator to the original Gulf port location. Likewise, a shuttle train approved location is given preference over other unit train load out locations. For domestic shipments, the computation of rail rates is based on the track capacity of the country elevator or domestic receiver. We assume that the grain shipper would maximize the use of his facilities and utilize gathering rates to reach the track capacity of the receiver.

Notable within the computational method is the use of both rail reported waybill rates and tariff rates depending on which value is the lowest.[2] Since the rail tariff rates generally use the short line miles, the actual tariff miles were computed for both the waybill derived and grain tariff rates. No consideration is given to the Burlington Northern Santa Fe Certificate of Transportation (COT) program, Union Pacific Railroad Grain Car Allocation System (GCAS) or OT-5 authority decisions by rail carriers.[3] Further, annual volume allowances or rebates and facilities construction allowances were not included in the rate computation.

The rail rating of feed ingredients follows assumptions similar to those used for the rating of grain - namely rates constrained by track capacity and the use of the lower of either tariff rates or rates estimated via the waybill model. Rail and barge transit programs for meals (soybean, cottonseed, oilseed and fish) were not considered.

VI METHODS AND PROCEDURES

As a result of pricing flexibility and differential rates allowed by surface transportation deregulation, it is sometimes difficult to determine the exact rate charged by a carrier on shipments moving under contract. Barge rates are a matter of negotiation between shipper and barge line operator, and these rates are not published in tariff form. Each carrier's rates are based on individual costs and specific market conditions, so that these rates will vary considerably between regions, across time, and from one barge line to another.

Contract rates are also common in pipeline, rail and motor carrier transportation and, like barge rates, may be maintained in complete confidentiality. In other cases (particularly grain), tariff rates are still applied. However, there is rarely any dependable means for determining whether a

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[2] Use of contract rates for the movement of grains appears to have peaked in 1986 when approximates 40% of all grain moved under contract. Since that time, a number of Class I carriers have returned to the use of traditional tariffs as the basis for rate calculations.

[3] C6-X cars are covered hoppers, holding 115 tons of grain each. They were introduced by some carriers beginning in 1994 and are widely used by Class 1 carriers.

contract rate or a tariff rate should be used to price a particular movement. A further complication is the use of rebates and allowances as an incentive by carriers to shippers to induce higher traffic volumes.

For the purposes of this study, actual rates, as provided by shippers, receivers, or river port operators, are used whenever possible. Sources for these rates are identified by footnotes within the worksheets for the individual movements. All other rates were obtained from published sources or, when this was not possible, estimated by TVA based on the mode of transportation, the tonnage, and other shipment characteristics. All rates, whether actual or modeled, are based on those which were in effect in June 2006. However, when necessary, reported rates have been refined to eliminate seasonal impacts or the effects of abnormal market conditions. The methodologies employed in the estimation of unobservable rates were developed through extensive contacts with shippers, railroads, motor carriers, and the barge industry. This information was often integrated with confidential federal data and/or the output of computerized simulation and costing models. This process was both guided and augmented by in-house TVA rating and costing expertise developed through decades of experience as a major shipper of coal and other bulk commodities and through the implementation of navigation-based economic development programs throughout the Tennessee River Basin.

Barge Rates

With the exception of grain and feed ingredients and spot market published rates, unobservable barge rates are calculated through the application of a computerized barge costing model (BCM) developed by the Tennessee Valley Authority (TVA). The TVA model has been refined to include 2006 fixed and variable cost information obtained directly from the towing industry and from 2005 data published within the Corps' annual *Estimated Towboat and Barge Line-Haul Cost of Operating on the Mississippi River System*. An explanation of barge model parameters is provided in Appendix 2.

The BCM model contains three costing modules: a one-way general towing service module, a round-trip dedicated towing service module, and a round-trip general towing service module. The one-way module calculates rates by simulating the use of general towing conditions between origin and destination, including the potential for a loaded return. The dedicated towing service module calculates costs based on a loaded outbound movement and the return movement of empty barges to the origin dock. The round-trip general towing service module is similar to the one-way, except that it provides for the return of empty barges to the point of origin. This module does not calculate costs for towboat standby time during the terminal process but does include barge ownership costs (maintenance, replacement cost, supplies, insurance, and administration) for both the terminal and fleeting functions. It does not require that the empty barges be returned with the use of the same towboat. Depending on the module in use inputs may include towboat class, barge type shipment tonnage, the interchange of barges between two or more carriers, switching or fleeting costs at interchange points or river junctions, and barge ownership costs accruing at origin and destination terminals, fuel taxes, barge investment costs, time contingency factors, return on investment, and applicable interest rates.

Barge rates on dry commodities are calculated with the use of the general towing service round-trip costing module. Inputs, based on information from carriers and the Corps' Lock Performance Monitoring System (LPMS) database and the Waterborne Commerce Statistical Center (WCSC) database were programmed into the module to simulate average towboat size (horsepower) and corresponding tow size (barges) for each segment of the Inland Waterway System. Other inputs include barge types, waterway speeds, horsepower ratios and empty return ratios and lock processing and delay time. These inputs are documented by Appendix 2 for 2006.

An example of a typical shipment cost in this analysis would be a dry bulk commodity (iron ore intermediates or cement clinker) originating on the Mobile Ship Channel at Mobile, Alabama and terminating on the Illinois Waterway at Chicago, IL. Based on the modeling process, this shipment

would be assumed to move in a four barge tow from Mobile to the Mississippi River at New Orleans, a twenty barge tow from New Orleans to St Louis, and a twelve barge tow from St Louis to Chicago. At each interchange point, appropriate fleeting charges would be calculated. Empty return (back haul) factors would also be included for each segment of the movement.

With the exception of movements involving some Northbound and tributary rivers, barge rates for grain and feed ingredients are estimated on the basis of a percentage of base rates formerly published in Waterway Freight Bureau Tariff 7 (WFB 7).[4] For movements with origins in the Upper Mississippi River Basin, the five year average percent of base tariff for the four U S Department of Agriculture defined reaches is used (See appendix 3). For movements on the Gulf Inter Coastal Waterway, an arbitrary rate as published in WFB 7 is added to the New Orleans base rate rate. Rates for those movements that traversed the Tennessee - TomBigbee Waterway are calculated through the use of the TVA general towing service round-trip costing module.[5]

Barge rates for asphalt, heavy fuel oils, and light petroleum products are calculated through the use of the dedicated service round-trip costing module. Twenty-four hours standby time is allocated at origin and destination for towboat terminal functions. Finally, rates for sodium hydroxide, vegetable oils, lubricating oils, liquid chemicals, and molasses are calculated through the use of the general service round-trip costing module. As a result of comparable barge sizes, these commodities normally move in the same tow with dry commodities.

Barge rates calculated by the use of the TVA model reflect charges that would be assessed in an average annual period of typical demand for waterway service. It should be noted that the model does not explicitly consider market factors such as intra or inter modal competitive influences, favorable back haul conditions created by the traffic patterns of specific shippers, or the supply and demand factors which affect the availability of barge equipment. These and other factors can

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[4] The expression of barge rates for agricultural commodities as a percentage of waterway Freight Bureau Tariff 7 is consistent with industry standards.

[5] There is no basis for rates via the Tenn-Tom in the Waterway Freight Bureau Tariff.

influence rate levels negotiated by waterway users. The model does, however, calculate rates based on the overall industry's fully allocated fixed and variable cost factors, including a reasonable rate of return on assets. It is TVA's judgment that the rates are representative of the industry and provide a reasonable basis for the calculation of NED benefits.

The TVA Barge Costing Model (BCM) is an interactive data set model designed to capture the cost and rate of barge transportation on the inland waterway system. The following data sets are included in the model:

1. Annual depreciated construction cost by barge type less salvage
2. Operating days by barge type and horsepower class
3. Administrative, overhead and insurance expense by barge type
4. Empty return ratio by barge type by river segment by direction
5. Processing and delay time at locks
6. Quantity (tons per barge) by barge type by commodity by river segment
7. Towboat speed by river segment and by direction (travel time)
8. Annual depreciated construction cost by towboat horsepower class less salvage
9. Labor and crew expense by towboat horsepower class
10. Stores and lubes expense by towboat horsepower class
11. Administrative, overhead, and insurance expense by towboat horsepower class
12. Barge fleeting and switching
13. Fuel use and expense
14. Barge and towboat routing edit
15. River segment distances
16. Return on investment
17. Direction edit
18. Loading and unloading barge times.

Railroad Rates

As in the case of barge, reported rail rates are used in every case for which they are available. However, in the face of incomplete information, most movements require the calculation of typical average annual railroad rates. For all commodities, two methods are used. First, the appropriate tariff rate is identified and the fuel surcharge for the carrier is added. Next, the Surface Transportation Waybill 2005 is used to generate an estimate of rail movement rate per mile and weight per car for the specific commodity and each carrier in the route. This rate per mile was then indexed to reflect rail

carrier cost increases from 2005 to 2006, and the carrier fuel surcharge was added in order to produce a final estimate of the most likely rail rate. For those cases in which the published tariff is lower than the estimated rate, the tariff rate is selected for use. Conversely, when the estimated rate is lower than the tariff rate, it is the estimated rate which is retained for inclusion in the surface and alternative rate analysis.

Motor Carrier Rates

Actual truck rates from river terminal surveys for off-river movements are used whenever possible. All other rates are estimated based on published motor carrier tariffs or regional rate quotations from truck brokers and contract motor carriers.

Handling Charges

Handling charges between modes of transportation are estimated on the basis of information obtained from shippers, receivers, stevedores, and terminal operators. Handling charges for transfer of commodities from or to ocean-going vessels are on the basis of information obtained from ocean ports or stevedoring companies. For import or export movements that involved mid-stream transfer operations, handling costs to or from land modes at a competing port with rail access are applied.

Except as noted within individual worksheets, it is assumed that movements of bulk products (for example, grain or fertilizer) would be handled through elevators or storage facilities. It was also assumed that liquid commodities transferred between modes would require tank storage. Additional costs are incurred at both river and inland locations if shipments remain in storage past the free-time period allocated by the facilities involved. Storage charges are usually assessed on a monthly basis.

Loading and Unloading Costs

Because loading and unloading costs are not usually documented by shippers and receivers, they are particularly difficult to obtain.[6] Moreover, these costs can vary considerably across firms. In an attempt to provide the best possible estimates of these costs, we use available shipper and receiver information in combination with data from Corps studies performed by other researchers, as well as previous TVA studies. These data are revised to reflect 2006 conditions then averaged as required. In those cases where varying sources produced disparate estimates, we relied most heavily on shipper and receiver estimates.

Methodological Standards

Two points should be noted regarding the methodological standards applied within this study. First, the standards described above reflect essentially the same processes TVA has applied (or will apply) in developing transportation rates for other recent (or ongoing) Corps studies. Specifically, the outlined methodology was used in the 1996 and 2000 Ohio River Study, the Upper Mississippi Navigation Feasibility Study, and the Missouri River Master Manual Review process and more than 70 inland waterway study projects for the Corps of Engineers. Thus, inter-project comparisons are facilitated by this uniform approach. More importantly, recent methodological improvements enable TVA to produce transportation rate/cost materials which are, simultaneously, more complete and more reliable than the transportation data TVA (or any other agency) has produced for similar studies in the past. Each rate study for each District of the USACOE is integrated into a series of data bases for quick accessibility and data manipulation.

VII SAVINGS TO USERS

[6] Loading and unloading costs are often considered a part of through-put or production costs.

Based on the second quarter 2006 cost levels, those users of the Upper Mississippi River and Illinois Waterway, represented by the 1,353 sampled movements, saved, on average, about $21.46 per ton over the probable overland route. Savings for each of the eight commodity groupings identified for this analysis are summarized below.[7]

Commodity	NED Shipper Savings per ton	NED Shipper Savings St Louis Trans-load and St. Louis O/D per ton
Aggregates	$5.23	$4.92
All Other	$26.04	$21.93
Chemicals-Industrial	$48.59	$23.33
Chemicals-Agricultural	$25.97	$21.37
Coal & Coke	$11.35	$7.66
Corn	$21.47	$12.80
Iron & Steel	$27.21	$15.89
Ores & Minerals	$22.42	$16.19
Other Grains	26.68	$11.34
Petroleum Fuels	$29.60	$23.86
Soybeans	$21.62	$12.28
Wheat	$18.20	$11.66
Total	$21.46	$14.03

[7] All rates and rate differentials are weighted average.

During the preparation of this study, we observed that, in a very few instances, the selection of barge transportation is more costly than the land alternative. There are a number of scenarios which work individually or in combination to explain this phenomenon. First, in some cases, the sample may occasionally capture a transitory use of barge which occurs when pipelines lack capacity or when rail cars are in short supply. That is to say, for some particular shipper/receiver barge is only the mode of choice when other transportation markets are unusually active. Secondly, long term contracts and large capital investments may lead to discontinuities in the relationship between relative rates and modal choice. While this is a short-run situation, it may, nonetheless help to explain what appears to be perverse behavior. Next, the analysis superimposes 2006 transport market conditions on set of 2004 modal choice decisions. In the vast majority of cases, this dichotomy is of little import. However, in a few isolated cases, transportation rates may have changed sufficiently, so that in 2006, barge would no longer have been the mode of choice. Finally, regulatory constraints on the new construction of coal and hazardous materials handling facilities may preclude the development of facilities necessary for some shippers to take advantage of changes in the vector of available transportation rates.

Next, a few observations should be made that describe the traffic patterns for the Upper Mississippi River-Illinois Waterway 2006 Rate Study. First, the length of haul has been reduced as shown by the reduction in the average barge mileage. Second, the empty return ratio on the Upper Mississippi River and the Illinois Waterway continues to decline level reflecting greater tow and barge operating efficiencies. Third, total traffic sample tons continues to grow resulting in a greater accuracy of the sample to explain the behavior of the population. Last, the number of rated commodities has grown reflecting a more diverse usage of the navigation system. In particular the growth in liquid chemicals requiring special tank barge equipment and the growth in steel

intermediates to the study area steel mills have produced significant tonnages and higher shipper savings.

Another set of observations need to be stated concerning the dock and shipper interviews that have been included with this report. First, the movement of grains to the river terminals is dominated by the truck mode, specifically farm to river terminal. The use of the rail mode was restricted to the movement of wheat to the Minneapolis and St Paul area and to corn and wheat to Chicago. It was reported that at other terminals the rail mode to the river was used once or twice a year to keep a switch active or occasionally for buying distressed grain for conditioning. Further, the off river unit train grain terminals have greatly expanded; however, the growth in identity preserved non-GMO grains for export have expanded the use of the barge mode and the use of mid stream transfer facilities in the Gulf. Last, coal and aggregate shippers are turning to the use of rail for year round car utilization and inventory reduction during the Upper Mississippi River winter closure period.

APPENDIX 1

SAMPLE RATES WORKSHEET

TRANSPORTATION RATE ANALYSIS
Upper Mississippi River-Illinois Waterway
(All charges are in dollars per net ton)

Ref. No.: (Page 1)

Commodity:
WCSC Comm Gp: **Tonnage:**
River Origin: **Riv Dest:**
Origin Port Code: **Dest Port Code:**
Origin WW Mile: **Dest WW Mile:**
Off-River Orig: **Off-Riv Dest:**

I. WATER ROUTE:	Mode	Miles	Cost
(1) Loading at origin	--	--	--
(2) Charge to transfer point	--	--	--
(3) Transfer charge	--	--	--
(4) Charge to river	--	--	--
(5) Handling at river origin	--	--	--
(6) Line haul charge	--	--	--
(7) Handling at river destination	--	--	--
(8) Charge ex river	--	--	--
(9) Unloading at destination	--	--	--
(10) Other	--	--	--
(11) Total	--	--	--

II. LAND ROUTE:	Mode	Miles	Cost
(1) Loading at origin	--	--	--
(2) Charge to transfer point	--	--	--
(3) Transfer charge	--	--	--
(4) Line-haul charge	--	--	--
(5) Transfer charge	--	--	--
(6) Additional leg to destination	--	--	--
(7) Unloading at destination	--	--	--
(8) Other	--	--	--
(9) Total	--	--	--

AUTHORITIES FOR CHARGES AND EXPLANATION OF REFERENCE MARKS:

TRANSPORTATION RATE ANALYSIS

Upper Mississippi River-Illinois Waterway
(All charges are in dollars per net ton)

Ref. No.: 0(Page 2)

Commodity:
River Origin: **Riv Dest:**
Origin WW Mile: **Dest WW Mile:**
Off-River Orig: **Off-Riv Dest:**

III. ALT ROUTE St. Louis:	Mode	Miles	Cost
	====	=====	====
(1) Loading at origin	--	--	--
(2) Charge to transfer point	--	--	--
(3) Transfer charge	--	--	--
(4) Line-haul charge to St. Louis	--	--	--
(5) Transfer charge	--	--	--
(6) Charge to transfer point	--	--	--
(7) Transfer Charge	--	--	--
(8) Final leg to destination	--	--	--
(9) Unloading at destination	--	--	--
(10) Other	--	--	--
(11) Total	--	--	--

IV. SUMMARY OF CHARGES:	Cost
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(1) Water Route	--
(2) Land Route	--
(3) Alternate Route via St Louis	--

AUTHORITIES FOR CHARGES AND EXPLANATION OF REFERENCE MARKS:

APPENDIX 2.

EMPTY RETURN RATIOS & HORSEPOWER BY RIVER SEGMENT

Average	Empty Return Ratios		Horsepower
River System	Hopper Down-bound	Hopper Up-bound	
Allegheny	27%	75%	1315
Alabama	87%	6%	1125
ACF	100%	100%	2560
Atchafalya River	44%	97%	1395
Tombigbee	13%	88%	1830
Black Warrior	65%	13%	1835
Cumberland	5%	95%	2400
Green	22%	57%	1620
MC-PA	65%	11%	1350
IHNC	32%	50%	1300
GIW(W)	41%	30%	1380
Illinois	18%	31%	2410
Kanawha	89%	8%	2560
Upper Mississippi	35%	10%	4000
Arkansas	17%	23%	2730
Monongahela	62%	28%	1750
Ouachita	21%	73%	1700
Old River	88%	12%	1700
Ohio River	20%	32%	2725
Missouri River	62%	50%	1100
Red River	2%	99%	1750
Tennessee, Lower	11%	46%	2350
Tennessee, Upper	95%	67%	1725
Tenn-Tom	88%	13%	2025

APPENDIX 3.

PERCENTAGE OF WATERWAY FREIGHT BUREAU TARIFF NO. 7 FOR THE MOVEMENT OF GRAIN

Waterway Segment	*2004 Percent of Tariff*	*2002-2006 Average Percent of Tariff*
Upper Mississippi River	242%	246%
Upper Mississippi River (243-634)	215%	223%
Illinois River	218%	215%
Middle Mississippi River (0-243)	184%	185%
Upper Ohio River	192%	187%
Lower Ohio River	194%	188%
Lower Mississippi River (to Memphis)	175%	172%
Lower Mississippi River (to NOLA)	232%	236%

Source: Illinois Department of Transportation / U.S. Department of Agriculture