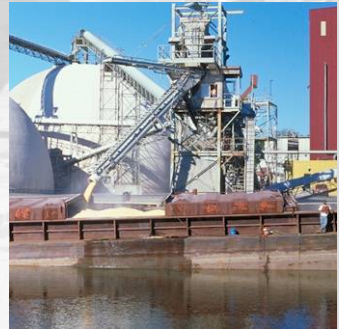


Assessment of Economic Impact of Potentially Discontinuing the Operation of the Upper St. Anthony Falls Lock

9 July 2012





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Executive Summary

Purpose

This economic analysis is an assessment of the regional economic effects of potentially closing the Upper Lock at St. Anthony Falls, which is considered an option to halt the upriver movement of Asian carp, a harmful invasive species. Closure of the lock would curtail barge traffic to the Upper Riverfront in Minneapolis. The study analyzes the changes in the transportation system and elements of the supply chain, identifies anticipated business adaptations to these changes, and describes the effect of these changes on:

- The state economy, including average annual output, wage income, jobs and value-added
- The sectors and businesses that use the commodities shipped through the locks
- The businesses that use the locks and their employees
- Recreational users, organizations and businesses

The report also addresses redevelopment potential of the Upper Riverfront if heavy industry is relocated.

This report does not address the economic impact of further carp migration into Minnesota rivers and lakes.

Context

The lock and dam system and a nine-foot channel for commercial navigation are maintained on the Mississippi River by the US Army Corps of Engineers. Commercial navigation capacity was extended north on the Mississippi River to the Upper Riverfront in Minneapolis with the construction of the Lower St. Anthony Falls Lock and the Upper Lock in the late 1950s and early 1960s with an investment of approximately \$300 million in today's dollars, paid for by the federal government (84 percent) and the City of Minneapolis (16 percent).

The major commodities and materials passing through the Upper Lock in the past five years, and the businesses and industries associated with them are listed in Table 1. The Mississippi River has served as a key corridor for transportation of such commodities, which have waxed and waned in their importance over the decades because of a variety of factors including economic trends, commodity prices, markets, the availability of other transportation modes and other competitive forces.

Table 1
Commodities, Businesses and Movement in the Upper Riverfront

Commodity	Primary Business	Secondary Business or Industry (Minnesota)	Movement
Scrap metal	Northern Metal Recycling, Inc.	Sellers of scrap metal	Downriver – national and international
Aggregate	Aggregate Industries, Inc.	Cemstone, Marshall Concrete	Upriver from Grey Cloud Island
Fertilizer	River Services, Inc.	Agriculture in Minnesota and the Dakotas	Upriver – national and international
Limestone products	Aggregate Industries, Inc.	Agriculture in northern and central Minnesota Construction in the metro area	Upriver from Grey Cloud Island
Coal	River Services, Inc.	Energy, manufacturing in the metro area and Greater Minnesota	Upriver from Ohio River system
Steel	River Services, Inc.	Manufacturers	Upriver – national and international
Twine	River Services, Inc.	Agriculture	Upriver - international
Machinery, equipment, structural components	River Services, Inc.	Processors and other users of large equipment; bridge construction and other users of large structural components	Upriver and downriver May involve rail transfer

Findings

The discontinued use of the lock would require changes in the distribution network of these businesses and industries:

- Shifting commodity movement from barge to truck
- Creating additional transportation and material handling costs for these businesses/industries
- Stimulating new capital investment to adapt to these changes
- Increasing truck traffic and related societal impacts
- Creating changes in employment.

The impact of the closure of the Upper St. Anthony Lock would be:

- The permanent loss of 72 jobs in the Minnesota economy (direct employment loss)
 - Of these jobs, approximately 28 individuals working in the aggregate, concrete, and recreational industries may find similar employment opportunities in the region.
 - Of these jobs, 44 are employed directly on the river including 23 employees of the Army Corps of Engineers. These people are less likely to find their skills in demand in the regional labor market. Older workers employed in river-oriented occupations may face the greatest challenges in adapting their lives and careers.
- A net permanent loss of an additional 12 jobs as the impact of the initial job cuts and reduced business spending ripples through the economy (indirect and induced change).

This number reflects the loss of 69 jobs and the addition of 57 new jobs in the trucking industry.

- An increase of 21,316 truck trips, concentrated during the work week, primarily in the 8.5 month period typically associated with barge shipment.

Potentially discontinuing operation of the Upper St. Anthony Falls locks would create a shift in transportation from barge to truck expected to cost Minnesota's economy \$21.5 million over the 2012-2040 timeframe. The majority of these costs would be attributable to vehicle operating costs, additional highway travel time, and the logistics cost of commodity delivery times. Other drivers of increased transportation cost include the safety and environmental costs of moving the displaced sand, gravel, crushed steel, iron ore, coal, fertilizer, steel, iron products and other commodities through the state by truck. These costs would largely be internalized by Minnesota firms earning revenue by providing transportation, warehousing and related services necessitated by the change. However, the costs would change the business environment in a way that causes an overall loss in economic activity to the state.

The \$21.5 million increase in transportation costs are the actual new costs (net present value over the next 28 years) imposed by the elimination of barge service to Minneapolis and the shift to trucks. The impacts reported below show how the economy responds to these costs, by changes in business output, resulting in people earning less money, supporting fewer jobs and limiting the ability of firms to create value. The overall economic losses are mitigated somewhat by increases in the trucking, materials handling and warehouse sectors.

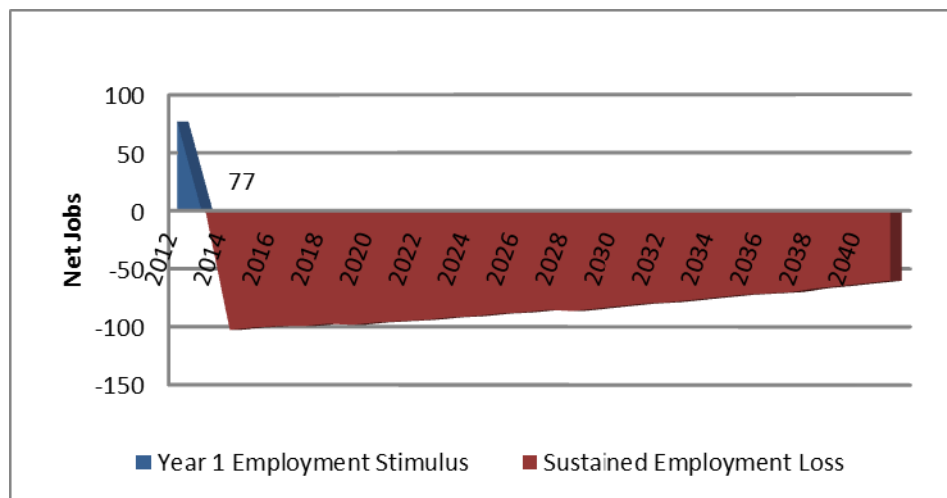
In the short term, the change is likely to create a stimulus in warehousing construction and material handling activity in the state, but this stimulus is expected to vanish after the initial year of the change-over from barge to truck operations. In subsequent years, an ongoing increase in business for local trucking operations would be more than offset by the increased costs for barge-dependent businesses and the resultant job loss.

The long term net effects of discontinuing lock operations (the direct, indirect/induced losses attributable to business operations, offset by the direct, indirect/induced increase attributable to greater use of trucking) result in an annual loss of approximately 84 jobs, \$5.3 million in wage income, \$9.3 million in value-added and \$14.4 million in economic output each year after the outlays for material handling and warehouse construction capacity stimulus is completed (Figure 1 demonstrates this trend from 2012- 2040. Details on average annual losses from 2013-2040 are shown in Table 2.) The increase in 2012 reflects the stimulus from investment in material handling and warehousing capacity. The longer term losses (2013-2040) are primarily attributable to specific organizations closing, downsizing or modifying their operations due to the higher cost structure of moving freight by truck instead of barge, combined with the positive increase in trucking jobs.

Types of Economic Impact

- Direct – Changes in economic activity in local industries
- Indirect - The impact of local industries buying goods and services from other local industries
- Induced - The re-spending of income by employees.

Figure 1 Net Change in Employment Because of Lock Closure (Direct, Indirect and Induced Employment Change)



There would be a one-year stimulus of 77 jobs because of investments in warehousing and material handling capacity. This would be followed by the sustained loss of approximately 84 jobs.

Table 2
Long-Term Economic Impacts (2013 to 2040) of Upper Riverfront Lock Closures

Other Economic Impacts	Non-Transportation Economic Impacts	Transportation Impacts	Total
Business Output (\$ mil.)	-\$22.1	\$7.7	-\$14.4
Value Added (\$ mil.)	-\$13.2	\$4.0	-\$9.3
Jobs (annual)	-141	57	-84
Wage Income (\$ mil.)	-\$8.1	\$2.7	-\$5.3

In the context of the Minnesota economy, which has more than 3 million jobs, \$166 billion in wage income, \$268 billion in value-added and \$494 billion in economic output each year, the impact would not appear to be significant. However, the impact to the specific businesses affected and the individuals who lose their jobs would be significant.

Importantly, the impact could be greater than described above because of problems that specific businesses may experience with their supply chain and localized traffic problems.

Regarding the supply chain, specific businesses would need to adjust their processes if barge access to the Upper Riverfront were eliminated. It can take time to adjust a supply chain, particularly in the case of coal where boilers are designed for very specific BTU and ash content to meet overall boiler and manufacturing process requirements and

pollution standards. In addition, permitted coal storage capacity is limited, and the cost and time to convert boilers can be a significant factor for manufacturers, processors and energy-related businesses. When regulated utilities make this transition, significant capital costs can be passed along to a relatively captive customer base, in accordance with the findings of the Public Utilities Commission. Businesses using coal in their manufacturing processes may be put at a competitive disadvantage if they are forced to make a major capital investment for boiler conversion, or experience a significant change in transportation or storage costs.

Another supply chain problem could occur in the agricultural sector. There fertilizer contracts are often signed two years in advance, and immediate closure would impact existing shipments and contracts. Ag industry representatives indicate they have been searching for sites for additional storage capacity on the Mississippi and Minnesota River systems for three years but have been unable to identify any available sites.

Although the number of additional heavy trucks placed on the regional highway system is not forecast to be significant, existing problems could be worsened in a few specific locations. More detailed analysis would be needed to forecast congestion or safety effects related to additional truck traffic.

The timeframe and scope of this study was limited, and additional research is recommended to explore several areas of concern:

- The capacity of manufacturers, processors and energy-related businesses to adapt changes in the supply chain
- The apparent lack of available sites for coal and fertilizer storage and distribution on the Mississippi and Minnesota River systems
- The potential need or opportunity to replace some of the capacity and special functions provided by the Minneapolis Upper Harbor Terminal
- The potential impact of additional truck traffic on specific routes
- Identification of reasonable timeframes for adjustment
- Public sector involvement in siting, permitting, etc.

Introduction

Purpose of this Study

This economic analysis is a forecast of the regional economic effects of potentially closing the Upper Lock at St. Anthony Falls, which is considered an option to halt the upriver movement of Asian carp, a harmful invasive species. Closure of the lock would curtail barge traffic to the Upper Riverfront in Minneapolis. The study analyzes the changes in the transportation system and elements of the supply chain, including storage and handling facilities, identifies anticipated business adaptations to these changes, and describes the effect of these changes on:

- The state economy, including average annual output, earnings, jobs and value-added
- The businesses that use the locks and their employees
- The sectors and businesses that use the commodities shipped through the locks
- Recreational users, organizations and businesses.

The impact analysis identifies:

- Required business outlays
- Displaced or reduced employment, earnings and output at the lock and dam facilities themselves
- Potential displacement or closure of businesses and other activities
- The societal costs imposed by a shift from barge to truck transportation
- Redevelopment potential of riverfront if heavy industry is relocated.

This report does not address the economic impact of carp migration into Minnesota rivers and lakes.

How this Study Was Prepared

Consultants

This study is the product of in-depth research and sophisticated modeling by a team of professionals experienced in economic development, economic analysis and transportation network simulation. The consulting team consisted of the following firms and individuals:

Economic Development Services, Inc.: A Minneapolis-based firm, established in 1994, specializing in economic development and redevelopment analysis and strategies.

- Janna King, CEcD, EDFP

Economic Development Research Group

Economic Development Research Group was founded in 1996 by economists and planners who are specialists in models and tools for evaluating impacts of transportation infrastructure, services, technology, workforce and natural resources on economic development opportunities. Their work concentrates on three subjects: economic impact analysis, market analysis and benefit-cost analysis. The transportation work of EDR Group includes studies of the economic impacts of road, air, sea and railroad modes of travel, including economic benefits, development impacts and benefit/cost relationships.

- Stephen Fitzroy, MRP, PhD
- Chandler Duncan, MRP, MBA
- Adam Winston, MBA

Edwards Consulting: Edwards Consulting conducts analyses and studies of economic development and economic impact.

- Mary E. Edwards, PhD., Emeritus Professor of Economics

Weber Community Planning: A Minneapolis firm providing services in comprehensive city planning, riverfront planning and transportation-supportive land use planning.

- William Weber, MRP, AICP

Research

The research process included on-site interviews with firms directly involved with barge transportation or recreational use of the Upper St. Anthony Lock (primary interviews). It included telephone interviews with businesses that would be affected by changes in transportation cost or storage capacity (secondary interviews). Interviews were conducted with the government entities identified in this report because of their roles and responsibilities associated with the Mississippi River, port function and recreational use associated with the Upper Riverfront. A focus group of recreational users was held at the Minneapolis Park and Recreation Board. Independent verification of all information provided was diligently pursued, including use of multiple sources, independent experts and government officials.

All of the knowledge gained from these interviews contributed to a global understanding of the transportation and economic systems related to river transportation, while certain quantitative findings (e.g., commodity volumes, number of barges) contributed to the simulation models.

Economic Impact Analysis and Transportation Network Simulation

Three simulation models were used:

- **Impact Analysis and Planning Model (IMPLAN):** The Impact Analysis and Planning model estimates the multiplier effects of changes in final demand for one industry on all other industries within a local economic area. It describes commodity flows from producers to intermediate and final consumers. The geographic area may be a single county, groups of contiguous counties, or an entire state. Measured are total changes in output, income, employment, or value added. For a particular producing industry, multipliers estimate three components of total change within the local area:

- *Direct effects* are a series of production changes or expenditures made by producers/consumers as a result of an activity or policy
- *Indirect effects* are the impact of local industries buying goods and services from other local industries as the cycle of spending works its way backward through the supply chain until all money leaks from the local economy.
- *Induced effects* are the re-spending of income by employees of supplier industries (recirculated through the household spending patterns which provide further local economic activity).
- **Transportation Economic Development Impact System (TREDIS):** This model uses information describing two or more transportation scenarios to estimate the economic impact of implementing one or the other. Information used in modeling includes start-up costs, ongoing maintenance and operational costs, type of travel mode and travel demand characteristics. Products of the model include but are not limited to travel characteristics (e.g., vehicle-miles traveled), changes in travel cost, regional economic impacts and benefits vs. costs.
- **Regional Travel Model of the Twin Cities Metropolitan Area:** This model uses data on the number of households, population and jobs in thousands of regional sub-sectors together with characteristics of the regional highway system (posted speed, number of lanes, etc.). The output includes volumes, speeds, delays and volume to capacity ratio. The Regional Travel Model was used to build the TREDIS model.

Asian Carp

Four species of heavy-bodied cyprinid fish are collectively known in the United States as Asian carp: grass, silver, bighead and black carp. The German carp was imported to the United States more than 100 years ago and is not part of that group. All of the Asian carp species have been cultivated in China for more than 1,000 years and are important worldwide for food and in total aquaculture production. These species allegedly escaped from fish farms in Southern states during river floods and have spread widely in the Mississippi river basin. Biologists believe that, together, the four species of Asian carp could undermine the food web for Minnesota's native fish and wildlife.

Some biologists believe that the most effective way to halt or slow the upriver movement of the Asian carp is by physical barriers, namely the locks and dams. It is felt that the locks and dams can help prevent the initial colonization of Minnesota waters by the Asian carp, prevent an increase in the number of carp after the pioneers, and delay their populations from growing exponentially.

The Lock and Dam System

The US Army Corps of Engineers owns and operates a series of 29 dams and locks on the Mississippi River for commercial navigation, the most southerly being near St. Louis. In the Twin Cities metropolitan area, there are five locks and six dams, as shown by Figure 2. There are dams upriver of the Coon Rapids dam, which are located at or near St. Cloud, Sartell, Royalton, Little Falls and Brainerd.



Figure 2
Lock and Dam Locations in the Twin Cities Metropolitan Area

The Locks in Minneapolis

Lock No. 1 (Ford Plant) was built by the Corps of Engineers in 1917, the Lower St. Anthony Falls Lock in 1956, and the Upper Lock in 1963. The original construction cost of the Upper and Lower Locks at St. Anthony Falls was \$31,700,000 in federal money plus approximately \$6,000,000 in other improvements from the City of Minneapolis (for a total of approximately \$300,000,000 in today's dollars). The annual cost to the Corps of operating and maintaining the three lock and dams and dredging the navigation channel between Minneapolis and St. Paul averages \$3.72 million.

The locks are occasionally opened during high water events to help regulate water levels above the three dams in Minneapolis. The primary purpose of the Upper and Lower St. Anthony Falls dams is to control the pool elevation for navigation. The dams at St. Anthony Falls were constructed to protect the falls, help generate water power and aid navigation. The dam elevation at the Upper Falls is controlled by Xcel Energy to provide stable flows for their Main Street hydroelectric plant. During high water flows, the dam gates at Lower St. Anthony and the lower lock gates at both St. Anthony locks are placed in the open position while miter gates on the upper end control excess flood water through the locks. While the Corps of Engineers can pass water through the locks at St. Anthony Falls during floods, Lock 1 has the ability to reduce flood damage.

Upper St. Anthony Falls Lock is 56 feet wide and 400 feet long. It is essentially one barge wide by two barges long. The Upper Dam has a fixed-crest spillway and a 49 foot head.

Lower St. Anthony Falls Lock is also 56 feet by 400 feet. The dam has a 26 foot head and four gates that may be raised or lowered to regulate the water upstream level. **Lock No. 1**, located downstream near the former Ford Motor Company plant, has twin chambers, each 56



Clockwise from above: Upper St. Anthony Falls Lock, Lower St. Anthony Falls Lock and Lock No. 1

feet by 400 feet. Dam No. 1 has a fixed-crest spillway and a 36-foot head. Every downstream lock is longer and wider than these and can accommodate larger groups of barges. For instance, Lock No. 2, near Hastings, and Lock No. 3, near Red Wing, are both 110 feet wide and 600 feet long.

Figure 3 illustrates the location of the Upper and Lower St. Anthony Falls Locks in downtown Minneapolis along with several other landmarks mentioned in this study such as the Upper and Lower St. Anthony Falls, the University of Minnesota steam generating plant, the Xcel Energy hydro power plant and the St. Anthony Falls Laboratory.

Xcel Energy Company owns and operates a hydro generating power at the Upper Falls. Brookfield Renewable Energy owns and operates one at the Lower Falls and another at Lock and Dam No. 1.

In conjunction with maintaining the locks, the Corps dredges a nine foot deep channel for navigation in the river as far north as the Minneapolis Upper Harbor Terminal, which is the northernmost point of commercial navigation on the river. Dredging would likely be discontinued above any lock for which service was discontinued. Lack of dredging would lead to increased siltation, higher water levels and reduced navigation depth above each dam.

The Number of Locks Potentially Closed

It is not known at this time how many locks in the Twin Cities might be closed if Congress decided to take that step. The authors of this study were asked to assume that the Upper Lock at St. Anthony Falls would be the subject of that action. Only Congress, not the US Army Corps of Engineers, has that authority. The Corps is not taking a position at this time. If the Corps were directed by Congressional legislation to discontinue operation of one of the locks and prepare an evaluation of whether to close others, then the alternatives considered would



Figure 3
The Upper and Lower Falls Area

most likely include closing one or all three locks upstream from St. Paul. This is because closure of one lock would curtail commercial cargo shipping upstream from St. Paul. There is no precedent for discontinuing the operation of a Corps lock in the United States when there is still regular commercial traffic. Some period of notice would be needed, as there are vessels above the locks.

Vessels through the Locks

There are three types of vessels that use the locks:

- Commercial: Vessels that transport commodities such as gravel or scrap metal and excursion boats that transport passengers
- Recreational: Canoes, kayaks, motorboats and other small private watercraft
- Non-commercial: Government vessels, non-cargo commercial vessels, and dredges.

The total number of vessels through the Upper and Lower Locks has declined slightly since year 2000 as has the number of lockages. (Sometimes there is more than one vessel per lockage.) The tonnage of cargo through the Upper and Lower Locks and Lock No. 1 has declined substantially, however, since 2000 (see below). The number of recreational vehicles through those three locks has fluctuated but remained fairly steady. In 2011, recreational vessels represented 56, 64 and 81 percent of all vessels through the Upper, Lower and No. 1 Locks, respectively, and 35, 49 and 65 percent of all lockages. The locks in the Twin Cities are operated from approximately April 1 through November 15 of each year.

Table 3
Traffic through the Locks, 2011

	Upper Lock	Lower Lock	Lock No. 1
Total Vessels	3,709	2,582	3,991
Recreational Vessels	2,079	1,650	3,241
Recreational Vessels as a % of all Vessels	56	64	81
Total Lockages	2,392	1,768	2,112
Recreational Lockages (Cuts)	846	865	1,366
Recreational Lockages as a % of all Lockages	35	49	65
Passengers	71,042	21,256	10,615

Source: US Army Corps of Engineers, 2012

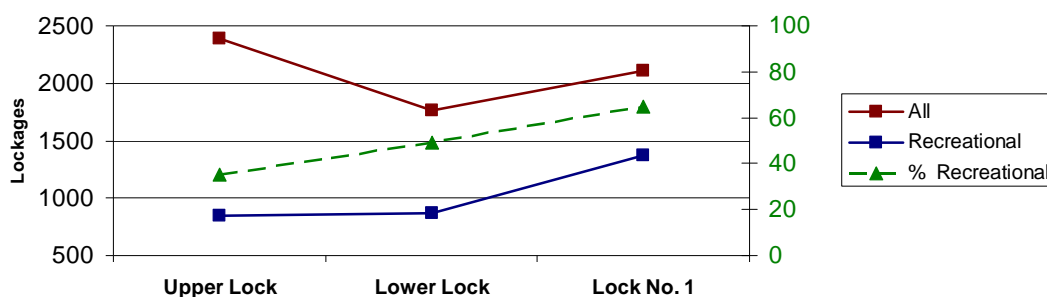


Table 4
Commodity Barges, Upper St. Anthony Lock, 2011

Empty Barges	481
Loaded Barges	561
Total Barges	1,042

Source: US Army Corps of Engineers, 2012

Materials and Tonnage on the Rivers

The tonnage of materials moved through the five major port areas on the rivers in Minnesota from 2005 through 2011 is presented by Table 5. The US Army Corps of Engineers and the Minnesota Department of Transportation both keep records of the types and tonnages of materials shipped on the river waterways system.

Table 5
Annual Port Tonnage on Rivers in Minnesota

Port	2011	2010	2009	2008	2007	2006	2005
Minneapolis	645,445	592,404	545,840	781,155	795,372	1,069,238	1,024,877
St. Paul	5,247,992	5,160,120	5,071,864	3,469,383	5,126,732	5,511,445	5,462,801
Savage	1,844,711	2,411,361	2,777,677	1,705,650	3,201,406	3,214,351	3,018,613
Red Wing	924,060	807,021	735,417	631,870	851,692	920,610	787,883
Winona	1,969,712	1,922,462	1,672,630	1,573,239	2,099,746	2,204,375	2,008,029
Total	10,631,920	10,893,368	10,803,428	8,160,297	12,074,948	12,920,019	12,302,203

Annual tonnages vary because of seasonal flooding, economic activity, freight rates and market demand for various commodities.

The major products moved to and from the Twin Cities on the rivers are listed in Table 6.

Table 6
Major Products Moved on the Rivers

Inbound	Outbound
Sand and gravel	Grain
Fertilizer	Petroleum
Salt	Petroleum coke
Cement	Scrap iron
Coal	Potash
Caustic soda	Asphalt
Slag	
Steel	

The commodities and materials moved to and from the Upper Riverfront in 2011 are illustrated by Figure 4 and listed in Table 7.

Figure 4
Twin Cities Ports and Goods Movements

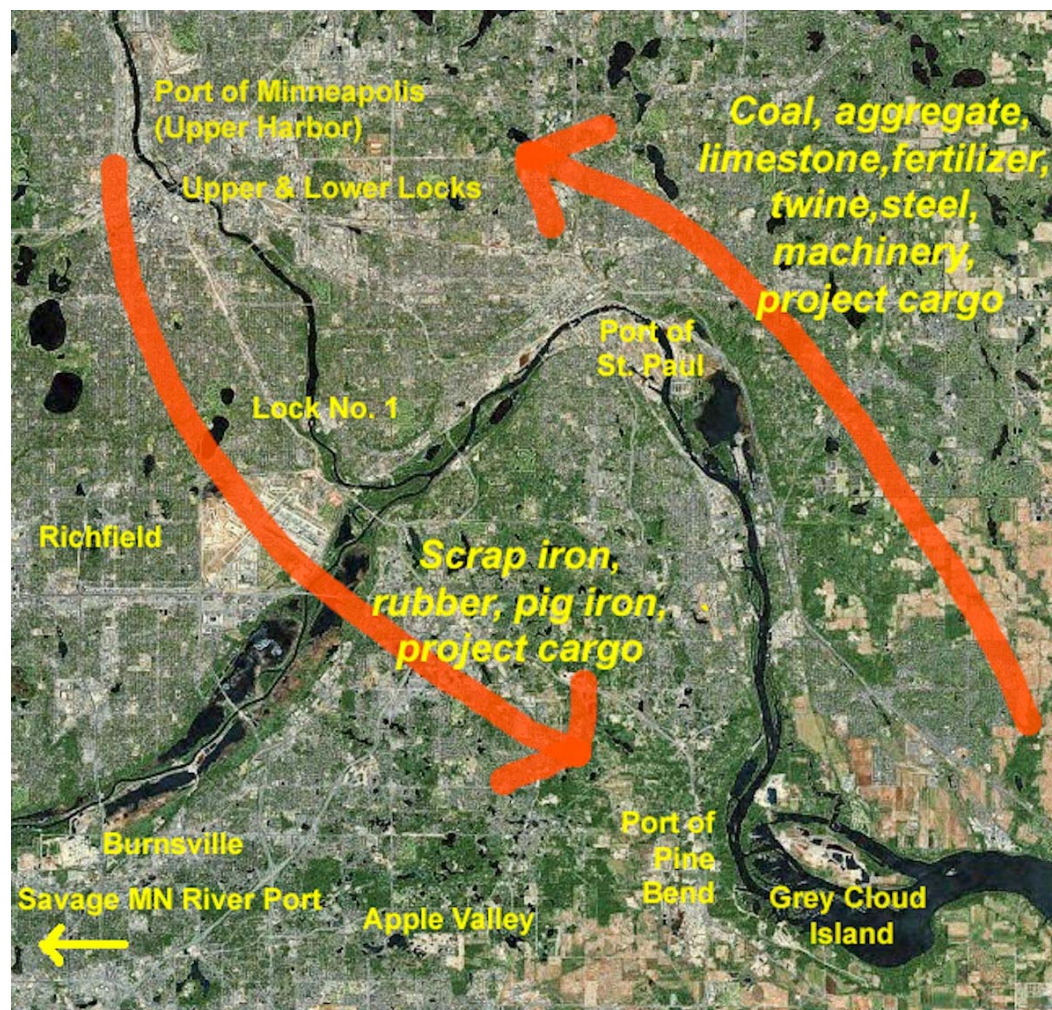


Table 7
Tonnage by Type, Upper St. Anthony Lock, 2011

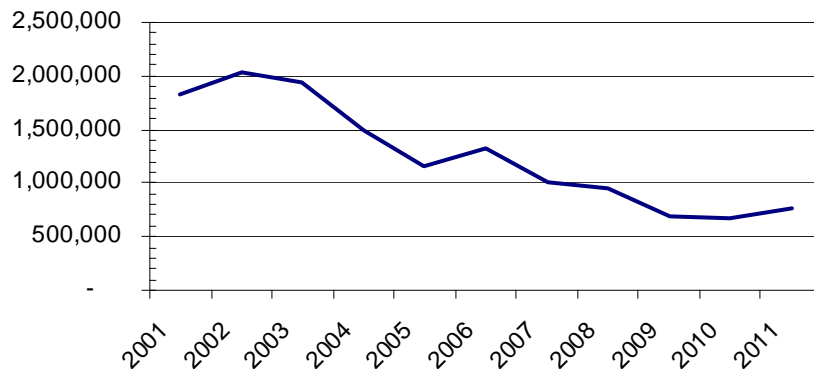
Description	Tons	Percent
Sand, gravel, stone, crushed rock	419,200	55
Iron ore, iron steel waste & scrap	174,800	23
Coal	88,200	11
Chemical fertilizers	46,200	6
Primary iron & steel products	19,500	2
Other chemical-related products	6,000	< 1
Crude Materials	1,500	< 1
Primary manufactured goods	1,500	< 1
Manufactured equipment & machinery	7,843	1
Total	764,951	100

Source: US Army Corps of Engineers, 2012

The tonnage is cyclical. After experiencing a low near 1990 for a variety of reasons, tonnage through the Upper Lock rose to a high around the year 2000 and has declined since then. Refer to Figure 5, below, and Table 9 in the next chapter.

Figure 5

Total Annual Tonnage through the Upper St. Anthony Falls Lock, 2001 – 2011



Tonnage records for the Lower Lock and Lock No. 1 are nearly identical to those of the Upper Lock. The current construction recession has worsened that trend. This trend could be reversed by an economic rebound, new markets such as the Williston basin in North Dakota, emerging practices such as containers on barge or other factors.

River Terminals

The major elements of the Twin Cities barge transportation system are the 32 river terminals, where barge cargo is transferred to rail or truck modes for local industries as well as shippers and consignees beyond the local area extending to the central northern states and Canada. The terminals are clustered in the ports of Minneapolis, St. Paul, Savage and Pine Bend. Refer to Figure 4.

Most of the terminals are affiliated with a single company that either handles its own cargo or provides limited contract services to outside customers. Six terminals are open to the public. Five of those six (Dakota Bulk, Gavilon, Alter, Northern Metal Recycling-St. Paul and River Services) handle a variety of cargo, including general cargo, grain, coal and other dry and liquid commodities. The sixth terminal is the recently improved Southport–St. Paul, which was designed and built primarily for servicing barges.

Barges are stored at specified locations along the river in barge-fleeting area. These areas are also used to break down tows of barges for delivery to terminals and to assemble tows of barges to be line-hauled to other port locations such as New Orleans.

There are three barging terminals above the Upper Lock:

- Northern Metal Recycling: Northern Metal Recycling uses its terminal for the export of shredded metals from a large on-site processing plant.

- **Aggregate Industries:** The Aggregate Industries facility is used for receiving and transshipping sand and gravel for making concrete and lime used by the construction and agriculture industries.
- **The Minneapolis Upper Harbor Terminal:** This is a City-owned terminal operated by River Services, Inc., handling a variety of commodities both upriver and downriver to and from inland destinations.

The locations of these Upper Riverfront terminals and other landmarks are illustrated by Figure 6.

City of Minneapolis Upper Harbor Terminal / The Port of Minneapolis

The City of Minneapolis Upper Harbor Terminal, a municipal facility opened in 1968 to replace the terminal at Bohemian Flats near the Washington Avenue bridge, handles the materials listed in Table 8.

Table 8
Materials Handled by the City of Minneapolis Upper Harbor Terminal

Northbound by Barge / Outbound by Truck	Southbound by Barge
Fertilizer	Scrap iron
Aggregate	Shredded tires
Coal	Large equipment and machinery
Pig Iron	
Steel	
Rolled steel	
Twine	
Asphalt	
Large equipment & machinery	

At the Upper Harbor Terminal, the 48 acres of land (almost a mile of riverfront) and fixed assets are owned by the City while the rolling stock is owned by the terminal operator, River Services, Inc. The City's contract with River Services, Inc. runs into 2014.

Storage is available on the ground or in an 110,000 square foot warehouse. The railroad track is located immediately adjacent to the barge dock, allowing for direct connection between barge and rail. The 2.5 mile rail line accommodates storage of 150 rail cars.

In 2011, the terminal served 130 barges; 90 percent of the material came in by barge and 90 percent went out by truck. In 2011, the terminal handled 60,000 tons of fertilizer and 120,000 tons of coal. The terminal is able to handle 50,000 pound coils of cold rolled steel, which is a specialty niche. Its capacity to store coal segregated from salt or metals is a special attribute that could be difficult to replace in the Twin Cities. Its ability to store coal (on asphalt) for winter use is also important regionally.



Figure 6
The Minneapolis Upper Riverfront

The Port of St. Paul

The Port of St. Paul is closely related to the Minneapolis Upper Harbor because it is the next port down river. St. Paul is important to the region because it is a “break bulk” point where tows of up to 15 barges are separated into smaller groups for diversion to Rosemount, Red Rock, Minneapolis and the Minnesota River terminals.

There are 14 terminals in St. Paul, 13 on land leased from the St. Paul Port Authority. CHS Crop Nutrients owns their facility. Aggregate Industries and Northern Metal Recycling each has a terminal in both cities. Other terminal users in St. Paul include Alter Metal Recycling, Archer Daniels Midland (grain and fertilizer), CHS Crop Nutrients (fertilizer and phosphate), Hawkins (liquid caustic soda), Lafarge (cement), Peavey (grain, fertilizer, coal, feed, steel, potash) and Westway (molasses, vegetable oil, biofuel, caustic soda, asphalt).

Other Ports

Other ports and river terminals in Minnesota are located in St. Paul Park, South St. Paul, Cottage Grove, Rosemount, Burnsville, Savage, Winona and Red Wing.

Regulatory Organizations

The Mississippi River falls under a variety of governmental jurisdictions, each of which was consulted for this study.

US Army Corps of Engineers

The Corps owns and manages the locks as well as the dam at the Lower Falls. Brookfield Power manages the dam at Lock No. 1. The Corps also maintains the nine-foot-deep navigation channel and helps regulate the level of the water by operating the gates at the Lower Falls. Both the locks and the channel dredging are budgeted and managed as part of the overall Mississippi River Nine-Foot Navigation Project.

The US Army Corps of Engineers is the proponent for the Inland Waterway Users Board, the federal advisory group that makes recommendations to the Congress and the Secretary of the Army on the priorities and spending from the Inland Waterways Trust Fund. The Inland Waterways Fuel Tax was established to support inland waterway infrastructure development and rehabilitation. Commercial users are required to pay this tax on fuel consumed in inland waterway transportation. Revenues from the tax are deposited in the Inland Waterways Trust Fund. The amount of tax paid by commercial users is \$.20 per gallon of fuel paid to the Inland Waterways Trust Fund and 4.3 cent tax directly to the US Treasury for deficit reduction.

The Corps also has regulatory authority to protect the nation's aquatic resources. Under Section 10 of the Rivers and Harbors Act, a Corps permit is required to do any work in, over or under a Navigable Water of the U.S. Water bodies have been designated as Navigable Waters of the U.S. based on their past, present or potential use for transportation for interstate commerce. Under Section 404 of the Clean Water Act, a Corps permit is required for the discharge of dredged or fill material into waters of the U.S. Many water bodies and wetlands

in the nation are waters of the U.S. and are subject to the Corps' Section 404 regulatory authority.

US Coast Guard

The Coast Guard regulates navigation on the rivers.

Minnesota Department of Natural Resources:

The Minnesota DNR administers the Mississippi River Critical Area, a program established by the State in 1976 to regulate land use along the river between the Cities of Dayton and Hastings for the sake of the natural environment, scenic beauty, recreation and economic development. Each city along the river has been required to prepare a local plan in conformance with the corridor master plan, adopt it as an element of its comprehensive plan, and adopt zoning regulations that conform with the DNR's model regulations to implement their local plan.

The DNR conducts a wide variety of studies, plans and capital improvements aimed at protecting or enhancing the natural environment, habitat for wildlife, and recreation for residents and visitors.

The DNR also has jurisdiction over the siting and design of marinas and boat launches along the river.

Minnesota Department of Transportation

The Minnesota DOT administers the Port Development Assistance Program, which pays up to 80 percent of the cost of certain major improvements. The DOT also conducts studies, research and planning to help keep its ports competitive and to help coordinate logistics among water, rail, road and air transportation.

National Park Service

The National Park Service administers the Mississippi National River and Recreation Area (MNRRA), a federally designated unit of the National Park Service that was established in 1988. The intent of MNRRA is to encourage cities to adopt policies for (1) the preservation and enhancement of the environmental values, (2) enhanced public outdoor recreation opportunities, (3) the conservation of the scenic, historical, cultural, natural and scientific values of the area, and (4) development that protects the natural, cultural, recreational, and economic resources of the corridor. Several islands downriver and the decommissioned US Bureau of Mines property near Fort Snelling are owned by the federal government for this National Park. The MNRRA boundaries are the same as those of the Critical Area. Local comprehensive plans must incorporate MNRRA and Critical Area policies.

City of Minneapolis

The City regulates land use and development along the rivers and builds public improvements such as roads. The City owns the Upper Harbor Terminal and was the local sponsor for the St. Anthony Falls locks. As such, it is required to provide a placement site for dredge material from the Corps of Engineers' channel dredging activities, which are currently located on the City's Upper Harbor Terminal and under the I-35W bridge on the north bank of the river.

Minneapolis Park and Recreation Board

The Park and Recreation Board owns, builds and maintains public improvements such as parks, paths, boat launches and boat docks that provide access to the Mississippi River. It also prepares plans such as *Above the Falls: A Master Plan for the Upper River in Minneapolis* (1999) and *RiverFIRST*, a parks design proposal and implementation framework for the Minneapolis Upper Riverfront. Implementation of *RiverFIRST* has been initiated in recent months.

Current Conditions and Industry Effects

This chapter describes the present situation and anticipated impacts with regard to commodities that pass through the Upper Lock, businesses or industries that use the Upper Lock to obtain their materials or ship products, recreation-providers that use the locks, and the redevelopment potential of the Upper Riverfront.

River-Related Commodities and Materials

The major commodities and materials that pass through the Upper Lock are:

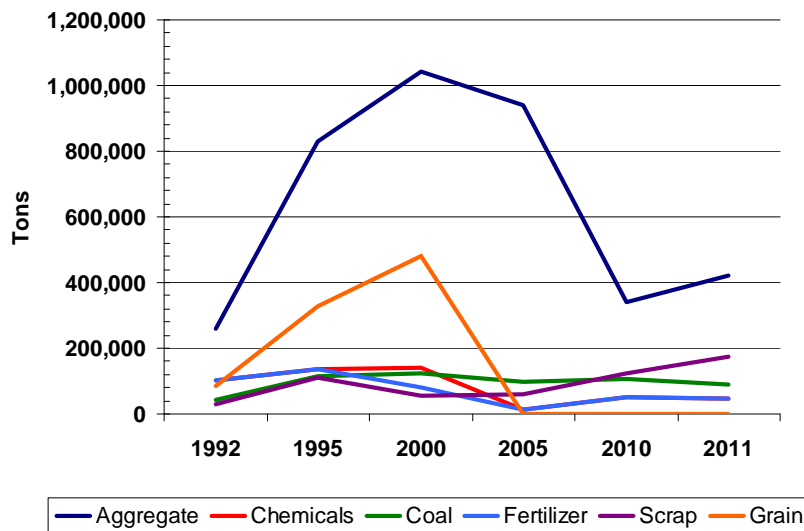
- Scrap metal
- Aggregate
- Fertilizer
- Coal
- Grain
- Flat Items, Large Machinery and Structural Components
- Cold-Rolled Steel

Barge transportation is a cost effective, energy efficient mode of transportation used primarily to transport bulk commodities. The Mississippi River has served as a key corridor for transportation of commodities, which have waxed and waned in their importance over the decades because of a variety of factors including economic trends, commodity prices, markets, the availability of other transportation modes, and other competitive forces. The following table and chart illustrate those trends.

Table 9
Historical Tonnage of Commodities through the Upper Lock, 1992 – 2011

Year	Scrap Metal	Aggregate	Fertilizer	Coal	Chemicals	Grain	Total
1992	28,400	261,200	102,000	40,500	102,000	84,800	590,500
1995	109,100	829,750	138,000	116,500	138,000	327,000	1,549,250
2000	54,000	1,044,000	81,000	121,500	141,000	481,500	1,869,000
2005	61,500	941,600	13,500	97,500	13,500	-	1,066,100
2010	124,500	339,500	49,500	104,625	49,500	1,500	544,625
2011	174,800	419,200	46,400	88,200	46,400	-	600,200

Source: US Army Corps of Engineers

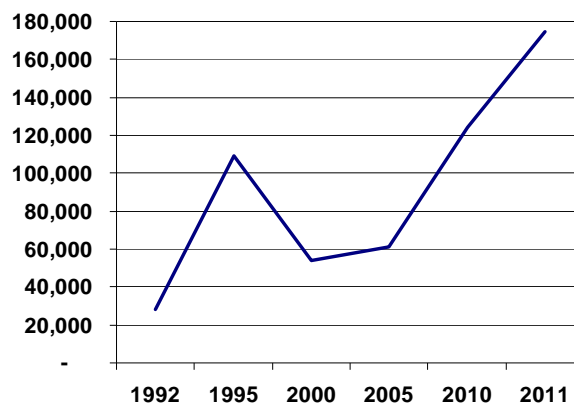


Scrap Metal

The scrap metal businesses in the Minneapolis and St. Paul are concentrated in the two areas that offer both barge access and access to rail. Competition among shippers keeps transportation-related costs reasonable; alternate modes allow the businesses to access diverse markets. The quantity of scrap metal shipped through the Upper Lock since 1992 is shown by the following table. Growth since 2007 reflects a change in ownership and expanded processing capacity.

Table 10
Scrap Metal Tonnage through the Upper Lock 1992 – 2011

Year	Tons
1992	28,400
1995	109,100
2000	54,100
2005	61,500
2010	124,500
2011	174,800



Northern Metal Recycling, Inc. maintains two operations in North Minneapolis, a recycling drop off operation, readily accessible from I-94, where scrap is collected from the public. The scrap metal processing operation, which is located on the Upper Riverfront, has state of the art equipment that can shred up to 100 tons of scrap metal per hour and a ground water

collection and filtration system. The facility cost “tens of millions”, according to its president.

Northern Metal Recycling also has two operations in St. Paul. A recycling drop off location open to the public in the Southport Terminal that is located off the river. At Terminal 1 in the Port of St. Paul, the company maintains a storage yard, dock and terminal. The St. Paul facility in Terminal 1 is served by the Union Pacific Railroad, and the Minneapolis Upper Riverfront facility is located on a Canadian Pacific rail line; other railroads also have running rights in the area.

At the processing facility on the Upper Riverfront, the company handles scrap from its network of scrap yards in eleven locations in Minnesota, North Dakota and Wisconsin, other small scrap collectors, manufacturers, other businesses, and the general public. Ninety-five percent of the material comes in by truck. The sophisticated shredding operation sorts ferrous and non-ferrous metals. Non-ferrous metals are shipped in containers by truck to foundries or international destinations via the container port in Los Angeles-Long Beach, California. The company’s ferrous metal markets are largely downriver, including domestic steel mills and international destinations. Shipments from the facility vary based on market conditions and shipping rates, but average approximately 70 percent by barge, 25 percent by rail and 5 percent by truck (to a foundry in Minnesota). During the winter when barge access is not available, the company ships to some of its markets by rail and truck.

Impact of Discontinuing Lock Operation

If the locks close, Northern Metal Recycling would continue to operate the shredder on the Upper Riverfront. It would be nearly impossible to find another location for the facility in the region and it would be too expensive to relocate. The company would continue to ship by rail to certain markets but would truck the majority of its scrap from its Minneapolis location to St. Paul where it would be put on barge for markets downriver. The company would incur additional handling and trucking costs. Based on interviews with scrap dealers in the metropolitan and St. Cloud areas, the scrap market is very competitive; consequently Northern Metal Recycling would likely have to absorb most of the additional transportation cost.

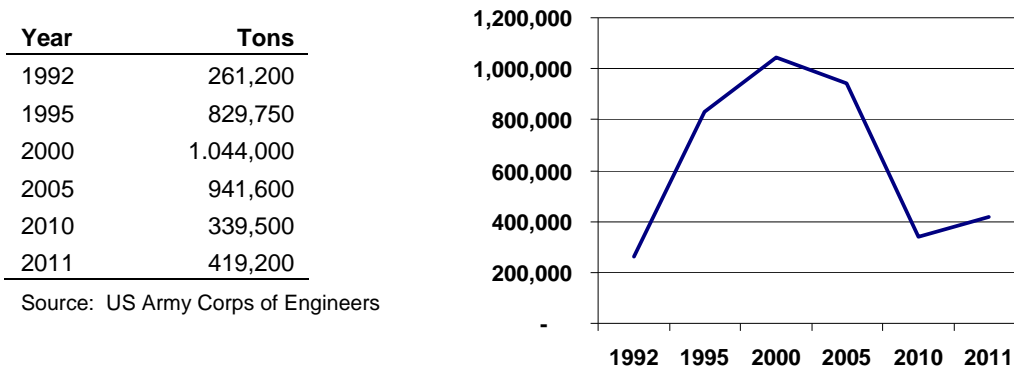
Rail service to St. Paul is not viable because of material handling, service and cost factors.

Northern Metal Recycling has enough land available at its terminal in St. Paul to accommodate the switch from barge to truck. It would need to make an additional capital investment of approximately \$500,000 to \$600,000 for material handling and storage in St. Paul including a scale and additional paved area.

Aggregate and Concrete

Aggregate, a mixture of sand and gravel, is one of three primary components in concrete, the other two being cement and water. Since 1952, aggregate has been mined on Grey Cloud Island in Cottage Grove and barged to downtown Minneapolis. Barging is an efficient way to handle and transport large quantities of aggregate to the central business district where it is needed for concrete in major construction projects. Past tonnage of aggregate through the Upper Lock is shown below.

Table 11
Aggregate Tonnage through the Upper Lock, 1992 - 2011



A concrete mixing plant located near the center of the metropolitan area is very important to both the road and building construction industries in Minneapolis and other metropolitan areas. This is because the higher grades of concrete used for roads, bridges and commercial or industrial buildings must be poured within sixty minutes of the time that they are mixed. The maximum allowable travel time for a truckload of concrete is reduced by the time required for pouring the load once the truck reaches the job site. The Cemstone plant on the Upper Riverfront operated 24/7 to rebuild the I-35W Bridge in nine months. Proximity of the plant was a critical factor in achieving the aggressive timeline according to an independent, retired concrete expert.

Construction must occur after 7 AM in downtown Minneapolis because of City regulations. Consequently, concrete trucks serving downtown projects must travel through traffic during normal work hours. This creates a critical advantage for a centrally located plant.

Locations of Aggregate Deposits in the Metropolitan Area

The location of aggregate deposits shapes the metropolitan market. Deposits in the region are limited. Anoka, Ramsey and Carver County have none. The resource in Hennepin County is now limited to Maple Grove, where most of it has been depleted. Dakota County has substantial deposits in Apple Valley, Lakeville, Hastings, and Rosemount. Washington County still has substantial deposits on Grey Cloud Island and in the Stillwater and Lakeland areas. There are also deposits in Elk River in Sherburne County, but because they contain a much lower percentage of gravel compared to sand they are more expensive to mine.

Residual material from a granite quarry in the St. Cloud area is expected to increase market share as aggregate deposits in the region are depleted.

Aggregate and Concrete Businesses Located in the Minneapolis Upper Riverfront

Aggregate Industries, Inc.

Aggregate Industries and its predecessor, the JL Shiely Company, have operated in three locations in Minneapolis:

- The “university coal docks site,” located on the western side of the Mississippi River opposite the University campus and just upriver of the Washington Avenue bridge
- In the “lower pool” at the site of the current Guthrie Theater after construction of the Lower St. Anthony Lock
- Its current site on the Upper Riverfront since being relocated by the City of Minneapolis in 1989.

Aggregate is shipped from the company’s Grey Cloud Island mining operation to its Upper Riverfront location by barges with tow-boats custom-designed for the Upper St. Anthony Falls Lock.

Cemstone, Inc.

Cemstone owns and operates a distribution network of concrete plants and aggregate facilities. Cemstone has a concrete plant adjacent to Aggregate Industries in the Upper Riverfront of Minneapolis. Another neighbor, Lafarge provides cement, which is shipped in by rail. Cemstone delivers and places concrete for roads, bridges and buildings. The company addresses a broad market segment including the demanding specifications required for roads, bridges, office towers and other commercial/industrial projects.

Marshall Concrete Products, Inc.

Marshall Concrete Products has produced concrete and concrete block in Northeast Minneapolis since 1936. They have satellite plants in St. Paul and Ramsey, and they sell concrete products and bagged cement from plants in Minneapolis and Hutchinson. Marshall Concrete’s primary customer base consists of residential contractors. The company also serves commercial, industrial and municipal markets.

Impact of Lock Closure

Cemstone and Aggregate Industries would continue operations on the Upper Riverfront, with aggregate delivered by truck instead of barge. While there is rail service in the Upper Riverfront adjacent to Cemstone, rail is not a competitive option because of site constraints, cost and service considerations. Trucking would increase the cost of aggregate to the Upper Riverfront by \$5 to \$7 per ton. This would translate into an increase in the cost of concrete from \$7.50 to \$10.50 per ton in and near downtown Minneapolis (a 5 to 9 percent increase). The increased cost of aggregate is likely to affect the market share, profitability and prices of Marshall Concrete and Cemstone’s Upper Riverfront facilities.

Marshall Concrete is uncertain about its ability to maintain sufficient market share in its residential market niche to sustain its operations should its aggregate prices increase because

of the shift from barge to truck. If the lock were to close, company margins would shrink and/or several competitors positioned to serve markets inside the I-494 / I-694 loop could gain market share.

Cemstone indicated that the company would maintain its facilities in the Upper Riverfront to meet market demand for the high performance grades of concrete and proximity to the job site required for roads, bridges and buildings in the core city. The increased cost of aggregate would allow Cemstone's competitors to gain market share within the I-494 / I-694 loop and the radius served competitively by Cemstone would likely shrink to the downtown core and immediately adjacent areas. The number of employees at its Upper Riverfront operation would likely decrease.

Aggregate Industries would likely maintain its stockpile and distribution operation in the Upper Riverfront to meet the needs of Cemstone and Marshall Concrete, shifting from barge to truck transportation and trucking material from its most cost-effective location. Because business volume is likely to decrease at Cemstone and Marshall due to increased prices, Aggregate Industries anticipates fewer employees at its operation on the Upper Riverfront. Some of the company's Minneapolis distribution activity would likely shift to St. Paul where barges from Grey Cloud Island would unload. The company has space available on its site at Terminal 1 in the Port of St. Paul to accommodate storage of additional material.

Examples of the Effect of Shifting to Truck from Barge for Aggregate Shipments

The following examples are presented to help portray the cost implications of shifting to trucks from barges for actual construction projects. The estimates were developed by Cemstone at the request of the consulting team. Cemstone provided concrete for these projects.

	Apartment Building (ten stories)	Twins Stadium	I-35W Bridge Replacement
Cubic yards of concrete	14,000	75,000	80,000
Tons of aggregate	21,000	112,500	120,000
Tons of aggregate per truck from quarry	25	25	25
Trucks from alternative quarry	840	4,500	4,800
Added cost per ton of aggregate	\$5.00 to \$7.00	\$5.00 to \$7.00	\$5.00 to \$7.00
Added cost per cubic yard of concrete	\$7.50 to \$10.50	\$7.50 to \$10.50	\$7.50 to \$10.50
Added concrete cost (total)	\$105,000 to 147,000	\$562,500 to 787,500	\$600,000 to 840,000

Limestone including Agriculture Limestone

Limestone is mined on Grey Cloud Island in Grey Cloud Township by Aggregate Industries, Inc., and transported via barge by company-owned tow boats and barges to Aggregate Industries' facility on the Upper Riverfront. Limestone sold by the company ranges in size from 4 inches to dust and is used in base paving, storm sewers, city streets, and landscaping material. Agricultural lime, very fine particles that result from grinding or handling limestone, is applied to fields before spring planting to reduce the acidity of farm soils.

The total amount of limestone products barged from that site to the Upper Riverfront in 2011 was in the range of 150,000 to 180,000 tons (125 to 150 barges). In 2011, there were approximately 12,000 tons (10 barges) of agricultural lime barged from the Aggregate Industries' quarry on Upper Grey Cloud Island to the company's "Yard D" on the Upper Riverfront. The highest annual volume of agricultural lime in recent years by Aggregate Industries has been 20,000 tons and the lowest 8,000 tons.

Agricultural lime is sold through cooperatives and other agricultural supply businesses serving markets north, northwest and west of the Upper Harbor Terminal. The distribution area for agricultural lime from the Upper Riverfront can basically be described as a triangle extending northwest from the terminal with I-94 and I-35 as two legs and reaching as far as approximately Sauk Center, Staples and Aitkin.

A representative of Aggregate Industries estimates that the amount of agricultural lime produced by their Upper Grey Cloud Island plant has been steady over the past ten years, although the total use of that material in the Upper Midwest has been increasing during that time because of a strong farm economy.

In 2011, Aggregate Industries trucked approximately as much agricultural lime from Upper Grey Cloud Island via County Road 75 as they transported by barge. However, the limit of trucking from that site may have been reached because of concerns by island residents. (Note: there is no trucking from the aggregate mine on Lower Grey Cloud Island because of the weight limits of the roads and bridges serving that location.)

Activity is typically concentrated into a two week time frame when trucks make multiple runs each day to Minneapolis to pick up lime and deliver it directly to farm fields. Applicators are on site when the trucks arrive and spread the lime in the fields immediately. The number of trucks and applicators owned or deployed is based on the driving time to the Upper Riverfront.

Impact of Possibly Discontinuing Lock Operations

Agronomy businesses and co-ops in central and north central Minnesota will operate less efficiently and will absorb or pass on additional costs to farmers in northern and central Minnesota.

Agricultural supply customers in central Minnesota indicated that Minneapolis' Upper Riverfront is the most convenient location for them to access lime during the busy spring planting season. If agricultural lime is no longer available there, they would most likely switch to purchasing it directly from a mine in Burnsville. A longer drive through metropolitan area traffic would increase transportation cost and slow the cycle time. To avoid having applicators stand idle, it would be necessary to deploy more trucks during the spring rush.

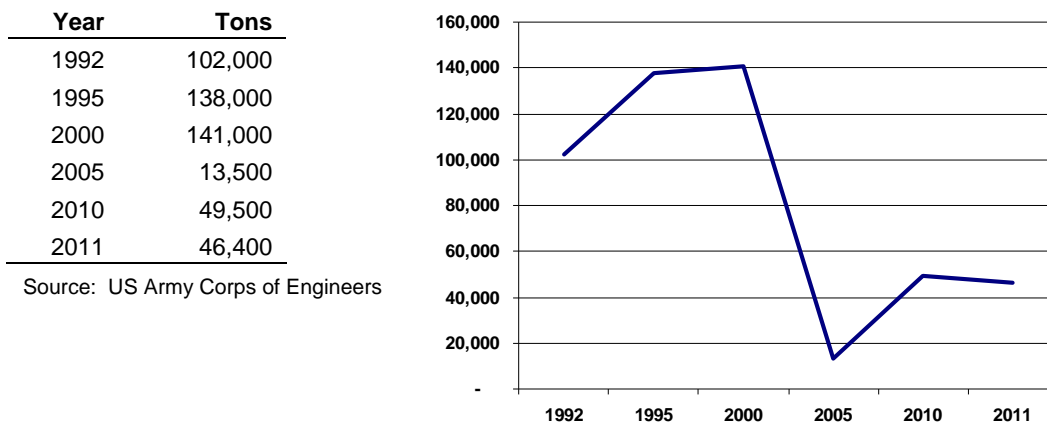
It is not clear whether Aggregate Industries will be able to supply agricultural lime competitively from the Minneapolis location because of increased transportation and handling

costs. And it is not likely that its St. Paul location would be competitive with a mine located in Burnsville for a significant part of its current customer base, because of the emphasis on time and distance during the busy spring planting season.

Fertilizer

Fertilizer is shipped from domestic and international locations to the Gulf of Mexico and up the Mississippi River to a number of terminals along the Mississippi and Minnesota Rivers. The Minneapolis Upper Harbor Terminal typically handles 60,000 tons of fertilizer per year and has a storage capacity of 38,000 tons in four domes.

Table 12
Chemical Fertilizer Tonnage through the Upper Lock, 1992 - 2011



Fertilizer from the Upper Harbor Terminal is destined for areas north and northwest of Minneapolis including agricultural areas of central, east central, north central, west central Minnesota and the Dakotas. As corn production has expanded north due to new varieties of corn and a longer growing season, fertilizer demand in this area has increased. Because of soil characteristics in the area demand is expected to remain strong or increase.

The fertilizer storage capacity at the Upper Harbor Terminal represents approximately 8.6 percent of the capacity in river terminals upriver from Hastings, as shown below.

Historically, Canadian potash was brought to the Upper Harbor Terminal and shipped downriver by barge, but markets have changed and potash currently moves upriver from international markets.

Table 13
Fertilizer Storage Capacities in Twin Cities

Terminal	Fertilizer Storage Capacity in Tons	Percent of Metro Storage
Minneapolis Upper Harbor Terminal	38,000	8.6
Alter River Terminal (ADM) -- St. Paul	17,500	3.9
Dakota Bulk Terminal -- St. Paul	10,000	2.3
CHS Crop Nutrients -- St. Paul	10,000	2.3
Gavilon (aka Peavey and Con Agra) -- St. Paul	48,000	10.8
Mosaic Crop Nutrition -- Minnesota River	120,000	27.1
CF Industries -- Pine Bend Warehouse	200,000	45.1
Total	443,500	100.0

The St. Paul Port Authority indicated that representatives of fertilizer companies have expressed interest in building additional capacity in the St. Paul Port; however, they don't have appropriate space available. ADM arranged additional fertilizer storage in St. Paul on a sublease basis with the Alter Trading Corporation, a scrap metal company. The ability to secure subleases is limited because agriculture related firms won't sublease to competitors.

Interviews with representatives of agricultural cooperatives that have multiple locations in central and north central Minnesota and that are supplied by the Upper Harbor Terminal provide insight into the fertilizer supply chain and the role of the Minneapolis facility in the region. The demand for fertilizer is concentrated in a brief window of time in spring and fall. All the corn in Minnesota is typically planted in twelve days in the spring. Trucks travel to the river terminals to get product not just from storage facilities but directly from barges which come upriver as early as possible in the spring. In years when flooding or ice restrict the movement of barges upriver, trucks have had to travel as far as Dubuque to secure fertilizer.

Impact of Lock Closure on the Fertilizer Supply Chain

Lock closure would add an estimated additional \$2 per ton charge for Central Minnesota fertilizer suppliers; some agronomy businesses/coops believed they would pass these costs on to their customers, others felt they'd have to absorb all or most of the transportation cost.

The fertilizer suppliers' primary concern is longer, less predictable travel times through the metropolitan area. Closure of the lock would require them to travel a greater distance to pick up product during the busy spring planting season. Elimination of the closest terminal and its related storage and dock facilities will increase pressure on existing terminals on the Mississippi and Minnesota Rivers. Waiting times during the busy spring planting season are likely to occur. Some fertilizer suppliers would chose to put more trucks on the road because of increased travel and wait times.

Because fertilizer contracts often run two years into the future, sudden closure of the lock could create business challenges for parties to the contracts.

The possibility of replacing storage was explored. However, storage capacity is not likely to be rebuilt because of a lack of available sites. Unloading directly from barges is likely to increase, but can be constrained by available dock wall space. The manager of a major farm cooperative indicated he had searched for space on the Mississippi or Minnesota Rivers for the past three years and could not find a suitable location. He reported that all the useable sites have been converted to parkland. Another individual who conducted a site search for a fertilizer supplier identified only one potential site on the Minnesota River; however it required a $\frac{3}{4}$ mile conveyor, which made the project cost unfeasible.

According to the coop manager familiar with investment details of their operations across Minnesota, South Dakota and Iowa, fertilizer storage with rail access alone is not likely to be successful in this region because shipping by rail erodes already slim margins, and a rail terminal can't compete in a region that has river access.

If a site could be found, the cost of replacing 38,000 tons of fertilizer storage has been estimated at \$6.35 to \$7.6 million (\$167 to \$200 per ton). The \$200 per ton figure was provided by a rural agronomy co-op manager and reflects only the cost of the storage itself and does not reflect the cost of a site, infrastructure, dock walls, conveyors or ancillary facilities.

Coal

Eastern coal is barged via the Ohio and Mississippi River systems to the Upper Harbor Terminal, operated by River Services, Inc. River Services stores the coal on-site for customers in a variety of sectors including energy, manufacturing and processing located throughout the metropolitan area, Greater Minnesota and South Dakota. Compared with western coal, eastern coal is higher in energy but also higher in sulfur content. This type of coal has some advantages for those firms that can burn it and still meet pollution standards.

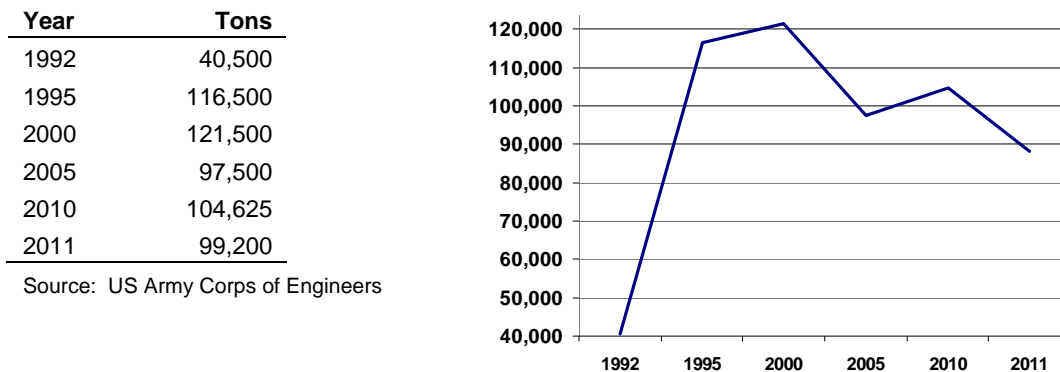
River Services provides up to 150,000 tons of coal storage in three separate piles, and is an important part of the supply chain for these coal users. The coal is stored on asphalt pads in segregated piles and stockpiled to meet customer demand over the winter. Piles must be segregated because users procure specific types of coal from specific mines to meet the specifications of their boilers, including BTU and ash content. Coal storage locations on the river are limited and some of the existing locations are not acceptable to the ultimate users of the coal because of nearby salt or metal storage. Contamination by salt or metal fragments can cause corrosion and other significant problems during the combustion process.

The only other coal storage location on the river in the Minneapolis-St. Paul region which is not located adjacent to scrap metal or salt is in the Red Rock area in the Port of St. Paul, which has a reported capacity to store an additional 90,000 tons of coal, or 60,000 tons in segregated piles. However, switching to this location may incur additional storage costs. Siting and permitting of new coal storage facilities is a complex process, and has previously encountered opposition in St. Paul.

A 200,000 ton coal storage facility is under construction in Winona, approximately 135 miles south of Minneapolis. Users in the metropolitan area and areas of Greater Minnesota located west or northwest of the metropolitan area will incur substantial additional transportation cost if their only option is to truck coal from Winona.

The quantity of coal shipped through the Minneapolis Upper Harbor Terminal has declined somewhat in recent years as some major energy generating facilities have made the transition from eastern coal. (See Table 14.) However, interviews with current coal users indicate that this is not a trend that can be assumed for all users because boiler conversion is costly. When regulated utilities make this transition, significant capital costs can be passed along to a relatively captive customer base based on the findings of the Public Utilities Commission. Businesses using coal in their manufacturing processes may be put at a competitive disadvantage if they are forced to make a major capital investment for boiler conversion, or experience a significant change in transportation or storage costs. There may also be technical reasons for not making the transition. One coal user, the University of Minnesota steam plant, recently converted its boilers to burn biomass and other fuels, but because of the combustion characteristics of biomass, may need to occasionally burn eastern coal.

Table 14
Coal Tonnage through the Upper Lock, 1992 - 2011



Impact of Discontinuing Lock Operation

The impact of lock closure on coal users will vary based on company, industry and location. The following impacts have been identified through telephone interviews with companies involved with eastern coal in Minnesota. Further research is recommended.

River Services, Inc.

The most direct impact of this change would be the loss of employees by River Services, Inc., at the Minneapolis Upper Harbor Terminal. There are twelve employees at this operation, who handle a variety of commodities, including coal, fertilizer, aggregate, steel and twine.

Upper River Services, Inc.

Approximately three people employed in breaking the barge tows in The Port of St. Paul and shuttling the barges to the Minneapolis Upper Riverfront would lose their jobs at Upper River Services, Inc. Similar to employees at River Services, Inc. these employees handle multiple commodities including coal, fertilizer, aggregate, steel and twine. (Note that River Services in Minneapolis and Upper River Services in St. Paul are two different and unrelated companies.)

Energy Service Providers, Manufacturers and Processors

Energy service providers, manufacturers and processors in Minnesota consumed coal shipped through the Upper Harbor Terminal for process heat, district energy and generation of electricity. Coal storage at the terminal is critical for at least one metropolitan area user. The lack of sufficient replacement storage in the metropolitan area may require some users to store coal in Winona and incur additional transportation costs. Users may incur additional storage costs in either metropolitan or non-metropolitan locations. Management at a district energy facility indicated that any cost increases would need to be passed on to property owners or tenants, but could not be passed along immediately.

Conversion to rail is not likely for these users since the economical shipment of coal by rail requires unit-train volumes. Shipping smaller volumes is more expensive and subject to the availability of cars and scheduling challenges. Most users do not have viable rail service and/or sufficient on-site coal storage facilities. Reliability is a critical factor for coal users, and small users have particular difficulty securing the timely, reliable and affordable coal delivery service from railroads that they require.

Flat Item Storage, Large Machinery and Structural Components

River Services, Inc. operates an 110,000 square foot warehouse at the Upper Harbor Terminal. Prior to the economic downturn in 2008, it “was bursting at the seams” with some seasonal fluctuations. Recently it has been operating at about 50 to 60 percent of capacity, and activity is picking up.

Typical warehouse commodities at the facility include twine for agricultural purposes and steel, particularly 50,000 pound coils of steel used by manufacturers. The warehouse accommodates this special niche well because of the floor loading capacity and fork lifts capable of accommodating the load. Primary manufactured goods are another, minor category totaling 9,043 tons in 2011.

Impact of Lock Closure on Warehousing

Firms using the warehouse at the Minneapolis Upper Harbor Terminal would need to seek alternate covered storage along the river. Calls indicate that existing space is fully occupied. New construction would require a suitable site with appropriate zoning, barge, rail and truck access. Calls to terminal operators downriver in the metropolitan area indicate that there may be one or two potential locations associated with other facilities with sufficient acreage for a

110,000 square foot facility. It is not known whether current warehousing rates on the river could support the cost of new construction and attract investment capital.

The specific manufacturers shipping large coils of steel through the Upper Harbor Terminal are not known to the research team. There may be unforeseen consequences if their supply chain is disrupted.

Impact of Lock Closure on Large Machinery and Structural Components

The Upper Harbor Terminal regularly accommodates project cargo, also known as “special picks” including oversized machinery and other large pieces of equipment such as parts for bridges, generators, gasifiers, or 350 ton lifts for bridge construction and repair, such as the nearby Lowry Bridge project. A recent shipment involved a \$10 million vessel that arrived at the Upper Harbor Terminal by rail and was barged downriver to the Pine Bend area.

The dock wall on the north side of the Upper Harbor Terminal is set up well to handle the load pressure needed for large cranes and heavy items shipped by river because of their size or weight. The lack of fluctuation in the river level also makes the Upper Harbor Terminal a desirable transfer location. In addition, the rail track comes down to the dock wall, allowing for transfers between barges and rail cars.

The capacity of the metropolitan transportation network to accommodate large structural components (e.g. bridge and similar components) and large machinery and equipment (e.g. high value vessels, generators, gasifiers) would be diminished if the Upper Harbor Terminal closes. The western metropolitan area would be disproportionately affected and east-west movement of large items is apparently of particular concern because of restrictions on rail movement through the metropolitan area.

River-Related Firms

This section profiles several businesses with operations on the Upper Riverfront that would be specifically affected if the operation of the Upper Lock were to cease. The effect of the lock closure on each business is briefly described.

Northern Metals Recycling, Inc.

Parent Company

European Metal Recycling, Ltd., (EMR) is headquartered in the U.K. EMR also owns Southern Recycling, LLC, and Camden Iron and Metal, Inc.

Locations

- In Minnesota: Minneapolis (two sites), St. Paul (two sites), St. Cloud, Glenwood, Willmar.
- In North Dakota: Bismarck, Milnor.
- In Wisconsin: Toy's Scrap & Salvage in Eau Claire and Rice Lake.
- The main Minneapolis location was purchased in 2007 from American Iron and Steel, which was established in 1885.



The shredder building at Northern Metal Recycling

Recent Facility Improvements

- EMR did extensive environmental remediation after it acquired the facility in 2007.
- Remediated the site with storm water, air and sound abatement controls.
- The eleven-acre paved yard slopes away from the river. Storm water is diverted into catch basins and stored in underground tanks for treatment and eventual use in operations.
- Installed a new, fully-enclosed metal shredder, said to be the environmentally cleanest in North America.
- New construction is LEED certified when possible.

Transportation

- Scrap metal comes to the facility by rail or truck
- Processed scrap is shipped out almost exclusively by barge when the river is open.
- Depending upon markets, processed scrap is typically shipped by rail during the winter months.

Employment

- Currently employs 80 workers
- If the lock were to cease operations, a company representative has estimated that employment would drop by 10 percent or stay flat.

Aggregate Industries, Inc.

Parent Company

Aggregate Industries, with headquarters in Saugus, Massachusetts; owns regional businesses in Maryland, South Carolina, Illinois, Minnesota, Colorado, and Nevada.

History

- Formerly the JL Shiely Company, which in the 1940s mined sand and gravel near Snelling and University Avenues as well as near I-494 and France Avenue
- In 1952, started mining Grey Cloud Island and barging aggregate, limestone and ag lime upriver to Minneapolis.
- Has operated in three locations in Minneapolis: (1) the “university coal docks site,” just upriver of the Washington Avenue bridge on the north bank, (2) the “lower pool” at the site of the current Guthrie Theater after the construction of the Lower Lock and (3) its current site on the Upper Riverfront since the company was relocated by the City of Minneapolis in 1989. It is located adjacent to a major customer, Cemstone, a concrete company.



Aggregate Industries yard on the Upper Riverfront

Plant Locations in the Twin Cities Metro Area

- Aggregate Division (crushed stone, sand and gravel and recycling). Plants in St. Paul (Yard A); Minneapolis (Yard D); Elk River; Lakeland; Lakeville; Nelson; Larson; St. Croix Valley.
- Ready-Mix Division. Plants in Belle Plaine, Lakeville, Le Sueur, Mahnommen, Minneapolis (61st and Lyndale), Newport, Rogers, and Shakopee.

Transportation

- Transports aggregate and limestone from mines on Grey Cloud Island in Cottage Grove to the Upper Riverfront
- Owns its own barges and tow boats that are custom-designed for the uniquely configured Upper St. Anthony Falls Lock.
- Aggregate shipments through the Upper Lock peaked in 2007 at 831,000 tons per year; shipments between 2008 and 2011 averaged 477,550 tons per year.

Environmental and Safety Awards for North Central Region

- 2007 Commitment to Environment Award. Scored in the top 5% of the industry for environmental efforts
- 2007 Commitment to Community Award.
- 2008 Named Environmental Business of the Year by Great River Greening.

Employment

- 100 employees
- If the lock were to cease operations, a company representative has estimated that employment would decrease in three of its Twin Cities operations.

Cemstone

Company Profile

- Founded and operated by the Becken family since 1927.
- Cemstone owns and operates a distribution network of concrete plants and aggregate facilities in Minnesota from Owatonna to Brainerd, as well as facilities in northern Iowa and western Wisconsin.

Upper Riverfront Operation

- Cemstone has a concrete plant adjacent to Aggregate Industries, its aggregate supplier and Lafarge, its cement supplier.
- From its riverfront operation, the company delivers and places high performance concrete for roads, bridges and buildings, primarily in the I-694/ I-494 loop. Cemstone addresses a broad market segment including the more demanding specifications required for roads, bridges, office towers and other commercial/industrial projects.



Cemstone facility on the Upper Riverfront

Notable Projects – Upper Riverfront Plant

I-35 Bridge completion in nine months; Minnesota Twins Stadium; University of Minnesota Gophers / TCF Bank Stadium; Lowry Avenue Bridge

Transportation

- Aggregate supplied by neighboring Aggregate Industries is barged upriver
- Cement supplied by neighboring Lafarge is brought in by rail
- Concrete is mixed on site and transported via trucks to job sites

Community Recognition

2010: Cemstone earned Green-Star certification by the National Ready Mixed Concrete Association (NRMCA) for its batch plant facility in East Bethel, MN.

Employment

- Forty employees at the Upper River yard
- If the lock were to cease operations, a company representative that the company would lose significant market share with a related loss of employment.

Marshall Concrete Products, Inc.

History

Family-owned company established in Northeast Minneapolis; currently operated by the third generation. Marshall Concrete Products has produced concrete and concrete block in Northeast Minneapolis since 1936.

Profile

The company has 50 employees and satellite plants in St. Paul and Ramsey. It sells concrete, concrete products and bagged cement from plants in Minneapolis and Hutchinson. Marshall Concrete's typical customer is a residential contractor. The company serves commercial, industrial and municipal customers. Customers of the Upper Riverfront plant are typically located inside the I-494 / I-694 freeway loop.

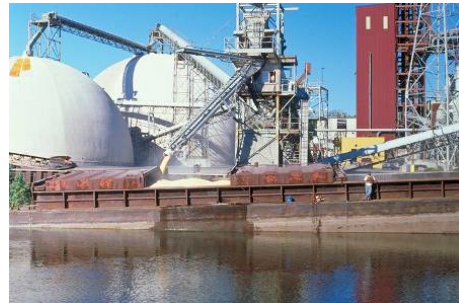
Transportation

- Aggregate is barged upriver by Aggregate Industries and trucked about one mile from the Aggregate Industries facility on the west side of the Mississippi River to Marshall Concrete's plant on the east side of the river.
- Ready-mix concrete and block products are trucked from the Marshall Avenue plant to residential construction sites.

City of Minneapolis Upper Harbor Terminal

The City of Minneapolis has owned the Upper Harbor Terminal (UHT) since 1968. River Services, Inc. operates the terminal under an agreement with the city, which expires in 2014.

This City-owned facility is located at the furthest point upriver on the Mississippi that is navigable by barge. The facility offers both barge and rail access (CP Rail) and includes two 200 foot docks, a 110,000 square foot warehouse, 38,000 tons of fertilizer storage and grain storage. The fertilizer storage consists of four tanks with 2, 8, 12 and 16 thousand tons of storage. The 2.5 mile rail spur provides storage which can accommodate up to 150 rail cars. The 49-acre site includes an area for storage of dredge material, as required in the City's host agreement with the Army Corps of Engineers. It also includes an asphalt pad, which allows for storage of segregated piles of coal. Approximately 15 acres of the site are paved. The City also operates a compost facility on the site.



City of Minneapolis Upper Harbor Terminal

Commodities handled by River Services, Inc., at the Upper Harbor Terminal include:

- Steel, coal, twine, agricultural lime, pig iron, shredded rubber, scrap steel, fertilizers, aggregate (aggregate used in sewer and other construction projects)

- Project cargo, also known as “specialty picks” – large pieces of equipment that require delivery by rail or barge. (e.g. parts for bridges, gasifiers, 350 ton lifts for bridge construction and repair)
- 120,000-140,000 tons of coal per year
- 60,000 tons of fertilizer; fertilizer storage capacity is 38,000 tons
- Fertilizer is going west, northwest and north
- Cold rolled steel including a unique niche of 45,000 pound and 50,000 pound coils
- Capacity to store large volumes of coal in segregated piles is critical for winter use and is a unique niche

Historically, the Upper Harbor Terminal was an important grain port for north central Minnesota. Markets changed in recent years due to ethanol production from corn and a strengthening of Asian markets and the UHT is no longer shipping significant quantities of grain.

Company History

- River Trading Company, Ltd. was established in 1986 in Cincinnati, Ohio to supply coal to the Upper Midwestern Market
- In 1992, Hatfield & Sons, Inc. purchased controlling interest in River Trading Company. The Hatfield companies have been involved with the coal industry since 1882. They are involved with ownership of coal mines, river docks, trucking companies and barge services and provide coal marketing, trading, dock and property management services.
- In 1991, River Trading Company formed River Services, Inc. to manage and operate the Upper Harbor Terminal owned by the City of Minneapolis

Transportation

In recent years most material arrives at the Upper Harbor Terminal by barge and is trucked out. Rail shipment and downriver shipment of grain were more active in the past under different economic circumstances.

Employment

- 12 employees long term employees (average tenure 24 years)
- If the lock were to cease operations, the River Services, Inc. operations in Minnesota would cease and all employees would lose their jobs.

Xcel Energy Hydro-Electric Power Plant

Xcel Energy Company owns and operates the St. Anthony Falls Hydro Plant at the Upper Falls. The plant has a capacity of 12 megawatts of electricity and has two employees. It was built in the 1920s and upgraded in the 1950s.

Xcel Energy also owns and maintains the Horseshoe Dam and the Upper Dam but not the Upper or Lower Locks. (Refer to Figure 3 for locations.) The locks are opened to release water from above the dams when the river flow exceeds 50,000 cubic feet per second (high water conditions). If the locks were not opened, a new “spillway” would have to be built to compensate. An Xcel representative has stated that they would be concerned about how they

or someone else would create the extra spillway that would be needed to release water in place of the lock.

A secondary concern has to do with replacing the riser boards on to of the dam that are used to raise the level of the pool so that Xcel has sufficient water for power generation. Xcel has to wait for low water conditions to replace the riser boards. If the lock were not available to reduce the water elevation above the dam, Xcel would simply have to wait for the water level to decline naturally. Management does not consider this a critical issue.

Brookfield Renewable Energy Hydro-Electric Power Plants

Brookfield owns and operates two hydro-electric generating plants, one at Lower St. Anthony Falls (LSAF) which has a long-term contract with Xcel Energy, and one at Lock and Dam No. 1. Brookfield employs three people for these two facilities.

The plant at Lower St. Anthony Falls is adjacent to the lock and has a capacity of 9.2 megawatts, enough to power 7,500 average homes. The plant at Lock and Dam No. 1 has a capacity of 18 megawatts. The \$35 million investment at the Lower Falls “went live” in December of 2011. The plant at Lock and Dam No.1 was purchased from Ford Motor Company in 2008.

Brookfield has a memorandum of understanding with the Army Corps of Engineers. If the lock operation were discontinued, the agreement with the Corps would likely need to be amended.

Brookfield currently works with the Corps to manage the level in the pools, which sets the water level difference that is essential for generating electricity. Brookfield is concerned that if the closure of either lock led to a change in mission by the Corps or if another group assumed operation of the lock(s), there may be a change in goals, commitment or knowledge that might negatively affect power generation. Similarly, siltation or lack of dredging in the pool between the upper and lower dams could negatively impact generation. A company representative feels that further hydrological investigation would be warranted if this change were to occur.

University of Minnesota Steam Plant

A University of Minnesota representative with oversight of the steam generating plant between the Upper and Lower Falls, has stated that the University is “not too concerned” whether the locks cease operation.

The University’s only concern relative to the locks is that the Corps of Engineers on rare occasions during a spring flood may need to open the locks to maintain the water elevation. That function



The University of Minnesota steam plant

needs to be retained because more than two feet of water on the floor of the steam plant will shut the plant down. The entire University would then be without steam and heat.

St. Anthony Falls Laboratory

The St. Anthony Falls Laboratory, located on Hennepin Island next to the Xcel St. Anthony Falls Hydro Plant, conducts research on fluid mechanics, river hydrology, dams, river ecology, river sedimentation, propeller cavitation, oil exploration, and other subjects. It is nationally and internationally known.

A laboratory representative has stated that it is important that a sufficient water flow be maintained through the building for their work; the water level in the pool needs to be maintained at a reasonable level. The opinion of the laboratory representative was that ceasing lock operation would probably not be a problem as the water levels should be sufficient with the flows through the rest of the system.



The St. Anthony Falls Laboratory of the University of Minnesota

The concerns of the laboratory representative were:

- Would closing the locks affect the water level in the upper pool?
- Would increased fine sedimentation there affect the water level or send extra silt into the lab? They currently have some fine sediment coming into the lab.
- Would closing affect how ice and other floating debris are distributed on the river and, if so, how might this affect the intake structure at the lab?
- What might be the impacts to the pool between the upper and lower falls? The operation of this lock and the elevation of the river affect the lower level of the laboratory, which can flood because of high pool elevation. Laboratory representatives would want to understand any changes regarding how the pool elevation is controlled and how it may change from the current operation.
- If the lower falls is not closed and the upper falls were closed and Asian carp were allowed to make it to the middle pool, what impacts would this have on the laboratory's operation? Would this differ if they were allowed to move up beyond St. Anthony Falls? Would populations grow to the point that the lab operation would be impacted?

River-Related Recreation Organizations

Several private businesses, not-for-profit organizations or public agencies are involved with recreation on the Upper Riverfront.

Not only does industry use the river for barge transportation, but small firms offer recreational services that depend on the Mississippi River. Paradise Charter Cruises and Padelford Riverboats would be affected if lock operation were discontinued as would Above the Falls Sports. Trips through the locks, particularly the forty-nine foot drop in the Upper St. Anthony Lock, provide unique excitement, drama and adventure.

National Park Service

The National Park Service administers the Mississippi National River and Recreation Area (MNRRA), a federally designated unit of the National Park Service that was established in 1988.

The intent of MNRRA is to encourage Cities to adopt policies for (1) the preservation and enhancement of the environmental values, (2) enhanced public outdoor recreation opportunities, (3) the conservation of the scenic, historical, cultural, natural and scientific values of the area, and (4) development that protects the natural, cultural, recreational, and economic resources of the corridor. The MNRRA is designated along the Mississippi river from the confluence of the Crow River to just below the confluence of the St. Croix River.

To further that mission, the National Park Service partners with Wilderness Inquiry, a local not-for-profit organization, to provide Mississippi River paddle trips for youth.

Minneapolis Park and Recreation Board

The Minneapolis Park and Recreation Board does not directly provide river recreation but does furnish river access to Paradise Cruises at the Boom Island Park marina under a lease agreement. Above the Falls Sports also puts its canoes and kayaks into the water via a Park Board landing near Bassett Creek.

The Park Board also owns a substantial amount of land along the river that includes trails, overlooks, parks and river access. Plans are being considered for additional riverfront park and trail access along the Upper Riverfront.

Paradise Charter Cruises, Boom Island, Minneapolis

Capacity

Paradise Charter Cruises operates two cruise boats on the Upper Riverfront, the *Paradise Lady* and the *Minneapolis Queen*, which are berthed at the Boom Island Marina under an agreement with the Minneapolis Park and Recreation Board. The *Lady* is 96 feet in length and accommodates 50 to 145 passengers in climate-controlled salons, open air decks and a dance floor. The *Queen* is 78 foot paddle-wheeler that can accommodate up to 125 passengers, also in climate-controlled salons. Both offer public cruises and private charters, dancing, a full bar and elegant dining.

Paradise Cruises attracted 50,000 passengers in 2011. The company feels that it has not had a “normal” year on the river since it opened in the mid-2000s because of a variety of circumstances, (e.g. I-35W bridge collapse, the closure of the Lowry Avenue bridge, high water conditions).



The Paradise Lady, owned by Paradise Charter Cruises

Recent contract negotiations between the Minneapolis Park and Recreation Board and Paradise Cruises eliminate the company’s ability to provide cruises through the lock to reduce the number of lockages. This limits operations to travel upriver 2.5 miles to the head of navigation just beyond the Minneapolis Upper Harbor Terminal. Private parties, including wedding, private parties and convention visitors, expecting the dramatic experience of moving through the locks, near the falls, through the historic grain milling areas near the Guthrie Theater, and into the steep wooded bluffs of the gorge have been disappointed. The company is renegotiating contracts, has lost revenue and employees. The Park and Recreation Board and Paradise Cruises are looking at relocation of the business to Bohemian Flats near the base of the I-35W bridge.

Partnerships

The company offers school trips for the “Journey to the Falls” program in conjunction with the National Park Service.

Tourism impact

In recent years approximately 65 percent of the customers of Paradise Cruises come for public cruises; the balance participate in private cruises. Approximately 30 to 40 percent of the total passengers are from outside the metropolitan area; nearly 100 percent of the passengers on the private cruises are from the metropolitan area or Minnesota. There is much coordination with Meet Minneapolis, the local visitors and convention association. A company representative reported that many passengers also avail themselves of other activities and attractions in downtown Minneapolis, particularly those from other states or countries.

If Lock Use Were to Be Discontinued

The Park and Recreation Board and Paradise Cruises have voluntarily restricted movement through the locks and are exploring relocation of the operation to Bohemian Flats near the I-35W bridge.

If dredging of the navigation channel were to cease with the closure of the lock, the large boats of Paradise Charter Cruises (and possibly Padelford Cruises) could be adversely affected by the accumulation of silt, particularly near docks. Paradise Cruises paid for half the cost of dredging around its dock at Boom Island in 2007 and in 2011; the Minneapolis Park and Recreation Board paid the balance. Siltation has much less effect on kayaks, canoes and row boats.

Padelford Riverboats, Harriet Island, St. Paul

Capacity

Padelford Riverboats, founded in 1969, operates four boats, the Jonathon Padelford, the Centennial Showboat, the Anson Northrup and the Betsey Northrup, all of which dock at Harriet Island in downtown St. Paul. The total capacity of the four boats is 760 passengers; the *Showboat* has a maximum capacity of 500 including a 225-seat theater; the *Jonathon* accommodates 160.

Tourism impact

The company provides trips for 80,000 to 90,000 customers.

Padelford clients are predominately from the five-state area but fifty percent of the trips serve out-of-town clients and five percent of the business is from conventions. Each Friday for 16 weeks in summer, a European tour group brings 50 visitors to tour the Mississippi River using on a Padelford boat. This has been going on for 15 years.



The Jonathon Padelford, the Anson Northrup and the Centennial Showboat

Partnerships

Padelford rebuilt the Minnesota Centennial Showboat owned by the University of Minnesota after it was destroyed by fire. The University owns that boat but Padelford manages the contract. The Showboat would not be affected if locks were to discontinue operation.

Padelford also works in conjunction with the National Park Service to provide Big River Journey Science Cruises for students in grades 4 through 6.

If Lock Use Were to Be Discontinued

If the operation of the Upper St. Anthony Lock were to end, the company would adapt, because trips above the Upper Lock represent a very small segment of the company's business. If closure of the Upper St. Anthony Lock ultimately resulted in closure of Lock 1 at the Ford Dam, the company would be more seriously impacted. The cruises that transit Lock No. 1 would cease, which would impact the company's wedding business and other longer cruise segments. Padelford could still provide luncheon cruises but they would not be as special as going through a lock. The industrial riverfront downriver from Padelford is not likely to be as attractive to customers, so the loss of business could be more serious.

Above the Falls Sports, North Loop, Minneapolis**Capacity**

Above the Falls Sports (ATFS) was founded in 2009 with a mission to promote recreation in the Mississippi River valley. The focus is on river activity.

The company sells, rents and stores boats; provides boat handling instruction in rowing and paddling; and operates group interpretive tours on the Mississippi River from its location above St. Anthony Falls. Tour capacity includes 50 paddling positions. ATFS interpretive tours explore the river up river from Upper St. Anthony Lock and down river through Upper and Lower St. Anthony Locks as well as Lock No. 1 to Harriet Island in St. Paul.



A kayaker on a river trip with Above the Falls Sports

Tourism impact

Above the Falls Sports uses the Upper and Lower St. Anthony Falls Locks as well as Lock No. 1 for 2.5-hour, four-hour and eight-hour tours. Losing movement through the Locks would impair what is currently a unique asset, an unencumbered waterway between two major cities. Paddlers and rowers, many of whom are visiting the Twin Cities, are awed by the river adventures.

If Lock Use Were to Be Discontinued

Above the Falls Sports would need to accommodate tours below St. Anthony Falls by shuttling boats and paddlers down river to an access at Bohemian Flats (about 20 blocks from the ATFS shop). This would necessitate acquiring a 15 passenger van and revising printed and website promotional materials.

Wilderness Inquiry

Mission

Wilderness Inquiry was established as a not-for-profit organization in 1978. It originally escorted disabled people to the Boundary Waters Canoe Area Wilderness.

It provides half day and three day canoe trips on the Mississippi River through its Urban Wilderness program. This service is targeted to those who are either economically or physically disabled, but all members of the public are invited.

Funding comes from private sources as well as Legislative Citizen Commission on Minnesota Resources (LCCMR), the Mississippi River Fund, school fees and fund raising events such as the Great River Race.

For 6th through 9th grade students, Wilderness Inquiry provides the Urban Wilderness Canoe Adventures (UWCA) in partnership with the Minneapolis Public schools. That program will host 10,000 students in 2012, with a goal of cultivating a sense of stewardship as well as an historical interpretation of the river.



A flotilla of paddlers on an outing sponsored by Wilderness Inquiry on the Lower Gorge of the Mississippi River in Minneapolis

Partnerships

Wilderness Inquiry partners with Padelford, Paradise Cruises and the Minnesota Historical Society. For 14 years, the organization introduced 50,000 inner-city students, grades 4 through 6, to the environment with their “Journey to the Falls” program. In addition, Padelford partners with Wilderness Inquiry to provide the “Big River Journey” for a St. Paul version of the same program.

If Lock Use Were to Be Discontinued

Wilderness Inquiry does not need the locks, but without them two more \$30,000 pontoon boats may be needed.

Water Rescue Services

When water rescue or similar emergency services are needed, the Minneapolis Fire Department will launch a boat from one of three locations: Webber Park in the Camden neighborhood, the Boom Island Marina or Bohemian Flats near I-94.

The St. Paul Police Department may launch from Hidden Falls Park, which is just downriver of Lock and Dam No. 1.

The Hennepin County Sheriff Water Patrol also provides emergency services on the river in Minneapolis. They have a boat stationed at Boom Island Marina and may acquire a second craft to be positioned between the Upper and Lower Falls.

Thus, those three agencies attempt to pre-position or launch boats in such a manner that movement through a lock is not needed, as that would be time-consuming.

Redevelopment Potential if Heavy Industry is Relocated

The City of Minneapolis and the Minneapolis Park and Recreation Board both have active planning efforts underway in the Upper Riverfront.

Background

In 1999, a far-reaching vision for the City's Upper Riverfront, entitled *Above the Falls: A Master Plan for the Upper River in Minneapolis*, was led by the Minneapolis Park and Recreation Board and adopted by both the City of Minneapolis and the Minneapolis Park and Recreation Board. The plan calls for significant transformation of a heavy industrial area served by rail and barge to new residential neighborhoods, continuous park frontage along both sides of the river, and job growth despite a reduced industrial footprint. A key goal of the plan is to create more linear parks and river access for residents of North and Northeast Minneapolis. Since its adoption, significant implementation steps have been taken, including park and trail expansion, renovating the Grain Belt Brewery complex, and establishing the Minneapolis Riverfront Partnership. Property redevelopment, envisioned to unfold over several decades, has been modest in the twelve years since plan approval.

City Council Direction

Much has happened in the decade since adoption of the *Above the Falls* plan that bears on the City's redevelopment objectives. Concern over the cumulative loss of industrial land and jobs resulted in the 2006 topical study entitled *Industrial Land Use and Employment Policy Plan*. Questions have arisen concerning the practicality and cost of sweeping land use conversion along the Upper River. And, existing property owners have requested more certainty regarding the timeline of redevelopment so that they can make better investment decisions. In response to these considerations, the Minneapolis City Council directed staff to "explore policy and regulatory strategies for providing existing property owners clearer expectations about the phasing of long-range land use transitions," and to analyze "potential

impacts of the [*Above the Falls* land use guidance] related to the extent and phasing of the ... transition from industrial to nonindustrial development."

Phased Work Plan

The Minneapolis Department of Community Planning and Economic Development (CPED) is undertaking the *Above the Falls Policy Review and Implementation Study*. The original *Above the Falls* plan recommended that adjustments be made to its vision if warranted and that steps be taken to advance its implementation. The review is being phased as follows:

- **Phase 1: Analysis.** Staff will conduct research and analysis of the land use and development recommendations of *Above the Falls* with a focus on the feasibility and desirability of different development futures. [April 2012 – nearing completion of Phase 1 Analysis]
- **Phase 2: Plan Revision.** If so directed after completion of Phase 1, staff will develop and propose specific modifications to the *Above the Falls* plan.
- **Phase 3: Implementation Actions.** Upon adoption of any modifications, staff will undertake actions to advance plan implementation.

Process

The project is being led by City staff with broad public and stakeholder engagement. Key stakeholders include the Minneapolis City Council, the Minneapolis Park and Recreation Board, the Minneapolis Riverfront Partnership, the Above the Falls Citizen Advisory Committee, neighborhood and business organizations and property owners. Work began in late 2009.

Minneapolis Parks Board - RiverFIRST

The Minneapolis Park and Recreation Board, an independent taxing jurisdiction, is leading the *Minneapolis Riverfront Development Initiative*, a design-based strategy to leverage parks as the engine for redevelopment of the Upper Riverfront with a vision to “reclaim the Mississippi – one of the three great rivers of the world and America’s “fourth coast” – as the source of our regional identity, and establish our region as a leading river community for the 21st century.”

Following a design competition that culminated in February 2011, the Park Board retained TLS/KVA to refine their winning RiverFIRST plan. In 2012, the TLS/KVA design team was retained to initiate design and planning for five priority projects along 5.5 miles of the Mississippi riverfront including:

- A riverfront trail system that will integrate with other regional parks and trails and Farview Park on the City’s North Side
- Floating islands which will provide water quality benefits and habitat
- Sherer Park, a recently acquired Minneapolis Parks property in Northeast Minneapolis
- A wetlands park that could transform significant acreage of the existing Port of Minneapolis
- A downtown gateway park;

Redevelopment Potential of the Upper River if Heavy Industry Is Relocated

The City of Minneapolis has been examining the 2000 *Above the Falls* master plan since late 2009 and is nearing completion of its research phase. Staff reports prepared in April 2012 for council member briefings indicate an affirmation of the *Above the Falls* vision for a number of the subareas and reflect a support of park development, as an amenity and to help set the stage for future redevelopment. But the vision for a sweeping transformation of heavy industrial areas into parks, trails and new residential neighborhoods has been tempered somewhat. Eminent domain power is no longer available for redevelopment, so success is dependent upon willing sellers – timing and conflicting land use issues pose additional challenges.

The April 2012 staff reports indicate that maintaining an industrial vision is recommended for the area north of Xcel's Riverside Generating Plant on the east side of the river and the area south of Lowry Avenue and north the Park Board Headquarters building on the west side of the river; that area includes Northern Metal Recycling, Cemstone, Lafarge and Aggregate Industries. The heavy industrial businesses in these areas are not likely to relocate, even with the loss of barge access, because of:

- Business critical location and transportation factors
- The feasibility of finding another competitive location, and
- In some cases, the massive cost of relocating expensive plant and equipment

The City and Park Board have long envisioned the City's 48-acre Upper Harbor Terminal, as a potential catalyst to redevelopment. The City's agreement with River Services to operate the Upper Harbor Terminal expires in 2014. It is not clear if the city will extend the lease beyond 2014. The city could decide to close the Upper Harbor Terminal even if the Upper Riverfront remains open to barge traffic. City staff has been working with consultants to examine redevelopment potential for the Upper Harbor Terminal.

In 2011 the City retained San Francisco-based consulting firm, Bay Area Economics, to examine market potential and redevelopment feasibility for the entire Upper Riverfront, an area also known as "Above the Falls." Subsequently, the City retained New York-based consulting firm, HR & A, to focus more narrowly on redevelopment in the Northwest Quadrant, a 130+ acre north of Lowry Avenue on the west side of the river. The firm assisted CPED staff in examining the market potential and the financial feasibility of two approaches to revitalizing the area: maintain and strengthen industrial or transform to residential/mixed use. Other options, including office, were eliminated based on clear indications that there would not be a market for those uses.

Four considerations were considered of primary importance:

1. **Public Purpose:** How does it advance public goals?
2. **Market Support:** Will the market support the development, and if so when?
3. **Public Finance:** What public investment will be required to attract development, and will it be recouped?
4. **Implementation Path:** How would the redevelopment be accomplished?

Market Assessment & Requirements to Activate the Market

The analysis prepared by HR & A and city staff indicates that an industrial redevelopment scenario can be initiated immediately with existing city development tools because of strong market potential. The residential redevelopment scenario cannot be initiated for 10 to 15 years and involves land-banking and other challenges related to conflicting adjacent uses and market timing.

Industrial

HR & A observed “a healthy (low vacancy, high traffic) industrial market in the NW Quadrant.” Interviewees confirmed the observation, underscoring the desirability of the area for industrial users given strong highway access to the city and region, and limited regional relocation options.” HR & A further noted, “Industrial uses thrive in the NW Quadrant because of its central location in the region, with a direct connection to I-94 at Dowling, providing access to customers and workforce.”

To activate the market, the City would need to clear and prepare the Upper Harbor Terminal site, provide site access by building a parkway, and use a gap financing program to attract development. Development on the Upper Harbor Terminal site could proceed north to south or vice versa with the land along Dowling Avenue marketed for an owner-occupied office campus. Elsewhere in the NW Quadrant, beyond the Upper Harbor Terminal, an approach that targets redevelopment of low value, functionally obsolete industrial properties would allow for gradual redevelopment that can co-exist with existing industrial users. The City could include this in a city-wide approach to create and market an industrial land redevelopment pipeline.

HR & A estimated that the industrial redevelopment scenario could be initiated immediately with Phase 1 yielding 620,000 square feet of industrial space, 1,200 new jobs and \$45 million in property value during a nine-year build-out. Phase II tax base and employment is difficult to project because it involves selective redevelopment of functionally obsolete properties that become available over time. A model that included complete redevelopment of the Northwest Quadrant for a job-intensive industrial park would add another 1.9 million square feet and house an additional 3,800 jobs. This is not likely to occur because 100 percent of the Northwest Quadrant would likely not be redeveloped.

Key considerations of this scenario include an increase in density and property tax base, creation of higher paying industrial jobs on the North Side of Minneapolis, support for the existing business base, attraction of new businesses, creation of sites for premier industrial facilities, strong near term market potential and straight-forward implementation using existing development and finance tools. From a regional perspective, it would allow for centrally located business and employment opportunities in an area well served by I-94.

In this scenario, neighborhood stabilization would involve creating effective processes and training to enable neighborhood residents to access employment opportunities. The average weekly wage for manufacturing jobs in Minneapolis in 2011 was \$1,008.67 or \$57,650 per year. (Quarterly Census of Employment and Earnings, Average 1st, 2nd and 3rd quarters, 2011.)

Residential

“The market for a master-planned residential neighborhood is still 10 to 15 years distant, or possibly more,” according to a staff summary of the HR & A research. The riverfront location and proximity to downtown are attractive features, as well as immediate proximity to high quality parks and the City’s Grand Rounds trail network. Barriers to redevelopment potential include the availability of lower-risk, higher reward sites elsewhere in the City or metropolitan area; proximity and visibility of heavy industry along the river; adjacency to rail and truck routes and large power lines; isolation of the area located in a narrow strip between the river and I-94; the lack of neighborhood shopping and other amenities; and concern about crime and safety in adjacent north Minneapolis.

Creation of a master-planned residential neighborhood 10 to 15 years or more in the future will require substantial public sector involvement and the construction of a critical mass of housing units in a limited time frame to overcome a variety of barriers. Requirements for market activation include: a strengthened housing market, site assembly and preparation, land-banking by the City or a third party, street upgrades, riverfront park and trail completion, additional public transit service, and access to desirable public schools and other services.

HR & A estimated that the residential scenario, if implemented in full, could be initiated as early as 2022 and would take 48 years to develop. Over that time period the firm estimated that 4,400 residential units would be developed and 252,000 square feet of retail space with 800 retail-related jobs. The average weekly wage for retail jobs in Minneapolis in 2011 was \$497.67 per week or \$25,879 per year. (Quarterly Census of Employment and Earnings, Average 1st, 2nd and 3rd quarters, 2011)

Key considerations associated with this scenario are significant uncertainty about market timing; disruption to long-time businesses (albeit as willing sellers, given the absence of eminent domain authority for redevelopment); and implementation challenges that include land banking and the expansive use of tax increment finance.

The benefits of this scenario are the long term growth in population and tax base, the support of an active river corridor, and the potential to stabilize nearby neighborhoods through the development of parks and a diversified housing mix. The residential approach would create the strongest neighborhood connection to the river; make new parks and trails busier and safer; create traffic for neighborhood businesses and stimulate new commercial amenities.

Hybrid

A hybrid scenario has also been identified with Phase 1 as new industrial development, constructing 300,000 square feet and 600 new jobs over a five-year build-out. Phase 2 residential redevelopment would occur later north of Dowling Avenue and generate 1,800 housing units with full build-out in 20 years.

Fiscal impact is an important public policy consideration and it was partially addressed in the HR & A analysis prepared for the City. The residential scenario creates a higher total property tax base than the industrial scenario after full build-out. However, the comparative analysis prepared by HR & A focuses solely on the cost: benefit to the City of Minneapolis

and does not reflect the revenues to the county, school district, transit, wastewater and other jurisdictions, and the differential costs to provide public services by those jurisdictions. It does not include a present-value analysis to reflect the substantially different redevelopment time horizons nor does it account for the costs and benefits of residential versus industrial tax base (e.g. differences in demand for public safety between residential and industrial properties; or increased school district capital and operating costs compared to increased school district tax revenue).

Statewide Economic Effects

This economic analysis assesses the impact on Minnesota's economy of potentially discontinuing the operation of the Upper St. Anthony Falls Lock on the Mississippi River in Minneapolis. The analysis examines the economic consequences of the lock closing that can be expected to accrue out to year 2040 if the lock ceases operation and compares this to a base-case in which the lock remains in operation. Two types of economic effects are presented:

Costs refer to the additional costs that the closure of the locks would impose on Minnesota's economy. Costs are reported in terms of present value (2010) dollars.

Impacts refer to changes in Minnesota's economy in response to these costs. Impacts are always reported in terms of average annual output, wage income, jobs and value-added.¹

The analysis assesses systemic, statewide effects on Minnesota's economy as a whole based on:

- Changes in transportation cost
- Required business outlays
- Displaced or reduced employment, wage income and output.

Because of the statewide focus of the study, it does not include a business analysis of how specific Minnesota firms may be competitively positioned relative to each other, transfers of employees, market share or revenue redistribution between Minnesota firms in the same industries or engineering-level transportation design or operational issues at specific locations. Instead, the focus is on net jobs, wages, value added and output gained or lost to Minnesota's economy and the overall transportation costs accruing to businesses who must substitute truck shipments for barge shipments as a result of the lock closing. All technical terms are defined in the Glossary (Appendix 2).

Key Drivers of Economic Impact

The economic impact of discontinuing the use of the locks is expected to result from:

- Re-assigning workers involved with operating the lock facilities to locations outside of Minnesota
- Transportation-related costs of diverting commodities currently using the Upper Mississippi River system from barge to truck.

¹ Definitions of these terms and other economic concepts are provided in Appendix 2 - Glossary

Diversions from barge to truck would result in additional fuel use, environmental cost, safety cost and operating costs of transporting the affected goods. These costs are then expected to be passed through the economy, creating induced and indirect (multiplier) effects on households and industries throughout Minnesota. The analysis assesses how these effects would be experienced in the statewide economy in terms of job losses and the associated lost wage income, reduced output and lower value-added.

Diversification of Barge to Truck

Barge traffic currently using the lock system is expected to be diverted to trucks and placed on the highway system instead of being shipped to and from the Upper Riverfront in Minneapolis via barge on the Mississippi River. Consideration was given to diverting those shipments to railroads, but it appears in most cases that rail transportation would not be a competitive option.

The following section briefly describes the expected tonnage diversion, the anticipated commodity mix and geographic distribution of diverted traffic, and how the number of truck trips placed on the state's highway system was determined.

Minneapolis Upper Riverfront

Three businesses located on the Upper Riverfront are involved directly with transportation of bulk materials by barge through the locks upstream of St. Paul.

- River Services, Inc. operator of the Upper Harbor Terminal, which is owned by the City of Minneapolis
- Aggregate Industries, Inc.
- Northern Metal Recycling, Inc.

In 2011, the US Army Corp of Engineers reported that an estimated 765,000 tons of freight were transported to and from the Upper Riverfront through the Upper St. Anthony Falls Lock.

The primary commodities that are transported and distributed through the Upper Riverfront are aggregate, lime, fertilizer, coal and scrap metal. Table 15 shows the most recent information available for all commodities passing through the Upper St. Anthony Falls Lock.

Table 15
Commodity Mix for the Upper Riverfront, 2011

Commodity	Tons	Percent
Sand, gravel, stone, crushed rock	419,200	55
Iron ore, iron steel waste & scrap	174,800	23
Coal	88,200	11
Chemical fertilizers	46,200	6
Primary iron and steel products	19,500	2
Other chemical-related products	6,000	0.8
Crude Materials	1,500	0.3
Primary manufactured goods	1,500	0.2
Manufactured equipment and machinery	7,843	1
Total	764,951	100

Source: Army Corps of Engineers, 2012

Discontinuing the use of the lock would require changes in the supply chains that companies use to support their industrial operations and make deliveries to their customers, including changes in material handling, storage, and transportation. Interviews conducted with each affected business provided the information about the potential effects of closing the locks based on access to alternative modes (e.g. rail or truck), transportation and handling costs, availability and location of storage, and reliability and timeliness other transportation and handling options.

Closing the locks would require freight moving upriver (primarily fertilizer, aggregate, coal, agricultural lime, twine, iron and steel products) to be picked up at other port locations along the Mississippi and Minnesota Rivers or directly at mine locations (in the case of aggregate and lime) and then trucked to customers. Scrap metal would continue to be processed on the Upper Riverfront, the location of Northern Metal's only functioning shredder and the hub for its network of scrap operations in Minnesota, Wisconsin and the Dakotas. During the river shipping season, Northern Metal Recycling would transport its processed scrap metal by truck to its barge terminal in St. Paul for shipment downriver by barge – the most cost effective means of shipping to the majority of the company's markets. Northern Metal Recycling would continue its current practice of shipping primarily by rail during the winter and trucking to some markets.

For purposes of transportation modeling, it was necessary to assign the new truck traffic to specific locations. Based on interviews with the three companies located on the Upper Riverfront, customers, and others involved with shipment of bulk commodities in Minnesota, the following assumptions were used²:

- Aggregate would continue to be mined on Grey Cloud Island and shipped upriver by barge to the company's existing operations in Terminal 1 at the Port of St. Paul. Aggregate going to the markets currently served from the Upper Riverfront operations

² Other alternatives may exist are discussed in greater detail in the other sections of this report.

would most likely be sourced from the company's operation in Terminal 1 in St. Paul or trucked directly from their mining areas in Lakeville.

- Limestone, including agricultural lime would continue to be mined on Grey Cloud Island and shipped upriver by barge to St. Paul where it would be trucked to some local agricultural markets currently served by the Upper Riverfront facilities. Agricultural lime customers in rural Minnesota and the Dakotas would most likely source their agricultural lime from mining areas along the Minnesota River near Burnsville.
- Fertilizer would be picked up at ports in Savage and Pine Bend along the Minnesota River.
- Coal would be trucked in from Red Rock (St. Paul) and Winona.
- Truck traffic is expected to grow at a compound annual growth rate of 2.79 percent based on forecasts of future industrial activity that use these commodities as inputs into production.

For purposes of transportation modeling, operational adjustments most likely to occur within a ten-year horizon were selected. The construction of replacement storage facilities, depletion of mines and other factors are likely to occur over the long-run and create additional changes in the ways in which these commodities are sourced and delivered to markets currently served by Upper Riverfront operations. However, given the speculative nature of such adjustments, these kinds of changes were not included in the analysis.

The addition of new trucks to the highway network in the metropolitan area by origin and destination was applied to time and distance estimates from the statewide transportation network model in order to incorporate impacts both inside and outside the metropolitan area. Assumptions used to estimate new truck traffic generated by the closing of the locks are highlighted in Table 16. All of the commodity pick-ups were assumed to originate inside of the metropolitan area except for coal in Winona. It was also assumed that 88 percent of truck deliveries would be made within the metropolitan area.

It should be noted that the truck trips in Table 16 are "net new" truck trips and represent only those added truck trips placed on the highway system net of the truck trips that formerly served the Upper Riverfront barge facilities. Because a large share of the tonnage diverted from barge to truck from the Upper Riverfront, approximately 21,316 net new round-trip truck trips are expected to be generated per year.

Table 16**Matrix of New Annual Round-Trip Truck Trips Generated Because of Transportation Re-Routing**

	Within the 7 County Region			Outside the 7 County Region							Total
	To Location	St. Paul	Mpls	St. Cloud	Isanti	Cokato	Santi-ago	Little Falls	St. Martin	Watkins	
From Location	Minneapolis	7,681	(5,886)	(1,288)	(441)	(441)	(441)	(441)	(441)	(441)	(2,138)
	St. Paul	1,038	10,045	1,002	171	171	171	171	171	171	13,113
	Dakota Co.		8,384	269	269	269	269	269	269	269	10,270
	Scott Co.										0
	Winona	21	33	17							71
	Total	8,740	12,576	(0)	0	0	0	0	0	0	21,316

Source: EDR Group

Traffic Effects

It is not expected that the net number of additional trucks on the highway system would be sufficient to lead to significant re-assignment of passenger car or truck traffic even in congested seasons and periods. Consequently, effects on traffic in the region are expected to be limited to the increased travel time, operating cost and associated safety and environmental risk of additional truck traffic on the network.

Transportation Performance Characteristics and Costs

Discontinuing operation of the Upper Lock could be expected to create 623,700 vehicle-miles of travel (VMT) and 14,120 vehicle-hours of travel (VHT) on Minnesota's highway system annually between 2012 and 2040.

Less than one percent of these net effects (VMT or VHT) are expected to occur under congested conditions. Traffic experiencing congested conditions would cause a higher per-mile operating cost and, due to operations in congested conditions, would increase uncertainty in delivery times (a measure of reliability cost³). The relatively small share of traffic that would occur in congested conditions is because the truck traffic is likely to be spread throughout the day and to occur only in certain seasons of the year.⁴

The assumed diversion to truck operations shown above translate into a cumulative increase (from 2012 through 2040 in terms of their net present value) of \$12.8 million in additional vehicle operating costs, \$6.8 million in travel time and reliability costs for businesses in the state of Minnesota, \$900,000 in safety costs, and \$900,000 in environmental costs – primarily attributable to air emissions created by the truck operations. Table 17 below, summarizes the

³ "Buffer Time" is the window of uncertainty in delivery times that increases in proportion to the percent of traffic occurring under congested conditions based on the "Buffer Time Index".

⁴ Refer to the end of this chapter for the quantitative assumptions used in this analysis.

\$21.5 million in overall cumulative transportation costs of truck-to-barge diversion resulting from potentially discontinuing the operation of the Upper Lock.

The present value of these costs change over time because (1) the costs are discounted 3 percent, making the present value of future years less than the present value in the current year and (2) the 2.79 percent growth rate tied to industrial output is expected to make the transportation cost somewhat higher over time.

Table 17
Cumulative Transportation Costs of Shifting from Barge to Truck (2012-2040)

Overall Cost	\$M 2010 ⁵	Description
Vehicle Operating Costs	\$12.8	Mileage-based costs of operating trucks (fuel, insurance, vehicle maintenance etc.)
Time & Reliability Costs	\$6.8	Hour-based costs of time spent transporting commodities (crew time)
Safety Cost	\$.9	Mileage-based costs of crashes (based on per-mile crash rates, crash types and severities)
Social/Environ.	\$.9	Environmental costs attributable to emissions for additional trucks on the transportation system.
Total Cost	\$21.5	All costs associated with shifting from barge to truck

Source: EDR Group TREDIS software using Minnesota IMPLAN Group data with travel demand inputs from Twin Cities Metropolitan Council.

Potentially discontinuing operation of the Upper St. Anthony Falls lock would be expected to create a shift in transportation from barge to truck that would cost Minnesota's economy \$21.5 million over the 2012-2040 timeframe. The majority of these costs are expected to be attributable to vehicle operating costs, additional travel time and reliability uncertainty and the logistics cost of commodity delivery times. Other drivers of transportation cost include the safety and environmental costs of moving the displaced sand, gravel and crushed steel, iron ore, coal, fertilizer, steel and iron products and other commodities through the state by truck. These costs would largely be internalized by Minnesota firms earning revenue by providing transportation, warehousing and related services necessitated by the change. However, the costs would change the business environment in a way that causes an overall loss in economic activity to the state.

The \$21.5 million in costs are the actual new costs (net present value over the next 28 years) imposed by no longer having the barge service available and having to use trucks instead. The economic impacts to the state show how the economy responds to these increased costs, by changes in net business output resulting in people earning less money, supporting fewer jobs and limiting firms in their ability to create value. The overall economic losses are mitigated somewhat by increases in the trucking, materials handling and warehouse sectors.

These costs would be borne by Minnesota's households and businesses. However, as will be shown in subsequent sections, some of the costs of diverting from barge to truck (the operating costs, time/reliability costs and the time and reliability costs) would likely be

⁵ The costs include all costs to society from 2012 to 2040, discounted at 3 percent.

recaptured to Minnesota's economy in the form of increased revenues for Minnesota-based local for-hire truckers, which get passed through the economy partially offsetting the additional costs of trucking in relation to barge.

Increase in Transportation Costs to Coal Users

Closure of the lock would result in increased transportation costs for coal users. Because of the closure of the locks, the sourcing of coal from Red Rock and Winona would require more trucking and transportation expense. These costs are attributable to incorporation of higher transportation costs in the coal that is used in Minnesota's economy. The effect of this change will be a 41 percent increase in the overall transportation cost to haul coal from the new pick-up locations on the river to the final point of consumption instead of using the current routes and distances.

Localized Transportation Costs and Performance Effects

The costs of the barge-to-truck diversion shown in Table 17 above would likely occur across Minnesota's highway system over a 28 year period from 2012 to 2040. However, it should be noted that there may be localized, traffic management and engineering issues on specific routes and at specific locations such as

- The exit ramp from Highway 61 to Warner Road into Terminal 1 in the Port of St. Paul,
- I-94 just north of downtown St. Paul,
- The I-94 Mississippi River bridge,
- I-94 at the Lowry Tunnel and immediately south of downtown Minneapolis in the Commons, and
- Broadway Ave. to Highway 280).

It is expected that the statewide traffic generated would account for less than 5 percent of peak-period, peak-season traffic at any of these locations, placing the effect within the margin of error currently available from the regional travel demand models. However, further study of traffic at these locations with micro-scale intersection, corridor simulation and traffic flow analytic methods could identify localized effects and solutions beyond the resolution of the regional economic modeling used in this current study.

Non-Transportation Impacts

In addition to the impact of diverting tonnage from barge to truck, other economic impacts would result from the ways in which businesses respond to the discontinued operation of the lock.

Construction

Through interviews with key business stakeholders, it has been ascertained that up to \$5.55 million in capital investment for new material handling and warehouse capacity would likely be required in Minnesota in the initial year. It is assumed this business outlay would be financed without affecting other business operations, and the outlay would not occur if the

locks remained in operation. This spending in Minnesota's economy would have a short-term positive impact on the economy.

Job Loss

In the long term, the economic impact attributable to lost jobs would be adverse as the Army Corps of Engineers expects to permanently re-assign 23 workers out of the state, and businesses in manufacturing, recreation and mining sectors have indicated that they expect to reduce operations in the state by an additional 49 workers as a result of potentially discontinuing the use of the Upper Lock.

Some of the losses associated with these 49 jobs are likely to be offset due to the potential for shifting labor demand within each sector (e.g. transportation activity shifts from barge to trucking; concrete work shifts from one plant or firm to another; amusement/recreation employment shifts to another company in amusement/recreation sector). However, history indicates that "total" re-absorption in most labor-intensive industries is unlikely. For regional impact modeling purposes, we assume that while many of these workers can be re-employed within the region, they would take jobs that would have been filled by other workers, leading to an overall loss of jobs. Furthermore a skills or geographic mismatch may exist between the displaced workers and the opportunities available locally. Older workers may have difficulty finding comparable employment even with retraining. Some workers may be faced with choices involving relocation and spousal employment concerns in a challenging housing and employment market.

In addition to the above changes, which are expected to be "net" changes in Minnesota's economic activity, there would also be transfers of workers, output and profit among affected Minnesota businesses that do not impact the state's overall economy at a level that can be analyzed through modeling but could be of strategic significance to these firms. These effects may arise from changes in the markets served by individual businesses, different levels of productivity within an industry and other firm-specific characteristics.

Statewide Economic Impacts

In the initial year of discontinued use of the lock, the \$5.55 million investment in business outlays for material handling and warehouse construction capacity in Minnesota's economy is expected to generate a net increase in economic activity. These investments are expected to outweigh the initial adverse impacts of additional transportation costs, as well as the loss of workers associated with businesses closing or relocating from the area in the first year.

Initial-Year Impacts

Overall, in the initial year of the lock closing (assumed for purposes of this analysis to be 2012), Minnesota is expected to experience \$10.4 million in additional business output, \$5.28 million in additional value-added, 77 temporary jobs and \$3.9 million in wage income because of outlays for material handling and warehouse construction capacity and other facilities required by the discontinued lock operations. (See the 2012 Material Handling and Warehouse Construction column in Table 18.) It should be noted that these impacts include

not only the outlays themselves, but also the indirect and induced economic impacts (multiplier effects). During this initial year, the added effects of additional activity associated with a shift from barge to truck movement would produce \$5.0 million in additional business output, \$2.6 million in additional value-added, \$1.8 million in wage income, and 37 jobs (net – direct, indirect and induced). These added economic effects account for the efficiency-loss of costs passed on to shippers. (See the 2012 Transportation Impacts column in Table 18.)

Types of Economic Impact

- Direct – Changes in economic activity in local industries
- Indirect - The impact of local industries buying goods and services from other local industries
- Induced - The re-spending of income by employees.

It should be noted that the transportation impacts in 2012 are positive for the state's economy, indicating that the stimulus to for-hire trucking firms creates more positive overall economic impacts than the costs of these services passed on to shippers. This is largely because all of the trucking services are expected to be provided by Minnesota firms, and trucking outlays have greater multiplier effects through the economy than additional costs of fertilizer, concrete, or recycled scrap metals and non-ferrous materials.

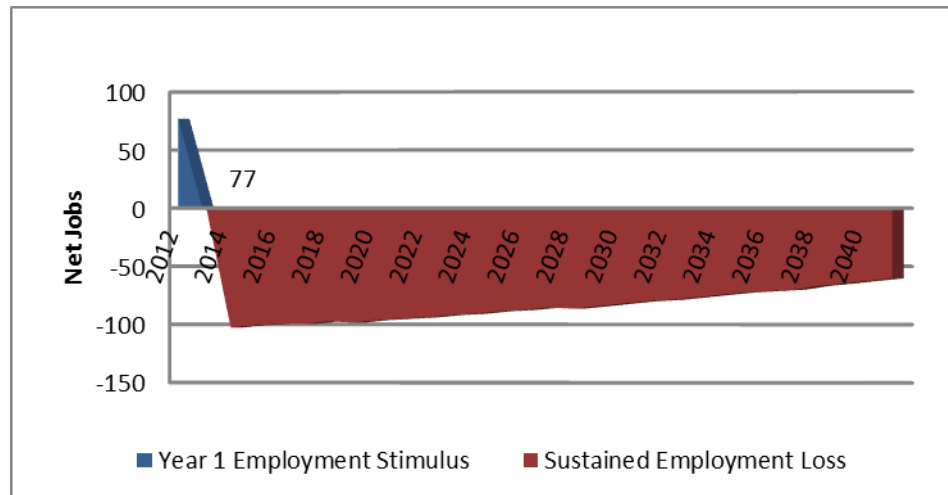
Long-Term Impacts

However, the positive overall impacts are not expected to continue beyond the first year with the long term total impacts creating net losses for Minnesota's economy. Most losses to the economy are attributable to the lost jobs of displaced businesses and lock employees. Once the spending effects of the material handling and warehouse construction pass through the economy, the average annual impact in any given year from 2013 to 2040 is expected to result in a permanent loss of approximately 84 jobs, \$5.3 million in annual wage income, \$9.3 million in annual value-added and \$14.4 million in economic output each year after the outlays for material handling and warehouse construction capacity stimulus is completed (Table 19).

Figure 7 demonstrates this trend from 2012- 2040. Details on average annual losses from 2012-2040 are shown in Tables 18 and 19. The increase in 2012 reflects the stimulus from investment in material handling and warehousing capacity. The longer term losses (2013-2040) are primarily attributable to specific organizations closing, downsizing or modifying their operations due to the higher cost structure of moving freight by truck instead of barge.

Figure 7

Net Change in Employment Because of Lock Closure (Direct, Indirect and Induced Employment Change) (2012-2040)



There would be a one-year stimulus of 77 jobs because of investments in warehousing and material handling capacity. This would be followed by a sustained loss of approximately 84 jobs.

Table 18
Impacts by Type and Period

Economic Impact Category	2012	2013-2040		2012-2040
Material Handling & Warehouse Construction Outlays	Other Economic Impacts	Other Economic Impacts		Total
Business Output (\$ mil.)	\$10.40	\$0		\$10.40
Value Added (\$ mil.)	\$5.28	\$0		\$5.28
Jobs (annual)	77	0		77
Wage Income (\$ mil.)	\$3.90	\$0		\$3.90
	2012	Avg. Annual (2013-2040)	Avg. Annual (2013-2040)	Avg. Annual (2013-2040)
All Other Industries	Transportation Impacts	Other Economic Impacts	Transportation Impacts	Total
Business Output (\$ mil.)	\$5.05	-\$22.13	\$7.72	-\$14.41
Value Added (\$ mil.)	\$2.59	-\$13.20	\$3.95	-\$9.25
Jobs (annual)	37	-141	57	-84
Wage Income (\$ mil.)	\$1.80	-\$8.07	\$2.74	-\$5.32

Source: EDR Group TREDIS software using Minnesota IMPLAN Group data with travel demand inputs from Twin Cities ; Metropolitan Council.

This impact includes both the direct job loss resulting from discontinued use of the lock as well as the induced and indirect impacts of this change in the economy. The direct jobs loss is attributable to affected businesses and the Army Corps of Engineers streamlining or relocating 72 jobs outside of Minnesota. This direct job loss can also be expressed as a direct impact on the output these workers would no longer produce in Minnesota's economy, the wages they would no longer earn and the value-added they would no longer create for Minnesota employers.

Combining the direct, indirect/induced impacts (definitions on page 62) equals a total loss of business output of \$14.4 million and 84 jobs in the Minnesota economy as listed below in Table 19. Table 19 shows the expected annual average negative impact on Minnesota's economy from business responses to the cessation of lock operations after the initial warehousing and material handling stimulus has completed in the first year.

Table 19 Long-Term Economic Impacts (2013 to 2040) of Upper Riverfront Lock Closures (Average annual impact)

Other Economic Impacts	Non-Transportation Economic Impacts	Transportation Impacts	Total
Business Output (\$ mil.)	-\$22.1	\$7.72	-\$14.41
Value Added (\$ mil.)	-\$13.20	\$3.95	-\$9.25
Jobs (annual)	-141	57	-84
Wage Income (\$ mil.)	-\$8.1	\$2.74	-\$5.32

In the long term, these losses to Minnesota's economy would be only slightly offset by ongoing stimulus created by additional business to Minnesota-based for-hire trucking firms. The gain in Minnesota-based truck transportation revenues provides an annual average net positive impact of over \$7.7 million in business output, over \$4.0 million in value-added, a gain of 57 jobs, and the increase of over \$2.7 million in wage income from 2013-2040.

These impacts include the direct impacts (caused by the change in costs) as well as the indirect and induced impacts (or 'multiplier' effects) as these costs are passed through the economy. (See the Avg. Annual 2013-2040 in Transportation Impacts column in Table 19).

Non-Transportation Impacts

The greatest potential losses to Minnesota's economy arise from non-transportation impacts of discontinued lock operation (shown in Table 19 as 'Other Economic Impacts'). These impacts are shown in Table 19 as the average annual impact. The non-transportation impacts result from businesses and jobs lost from organizations that have indicated they are likely to streamline operations because of discontinued barge service. It is understood that in the long term (from 2013 to 2040) these jobs and associated dollars of output, value-added and wage income would gradually be replaced as the economy recovers from the loss of these businesses. For this reason, in 2040 it is expected that the average impacts shown in Table 18 represent a "worst case" economic impact for the state's economy.

Assumptions Used in the Transportation Performance Characteristics and Costs

Tables 20 and 21 show the per-mile and per-hour operating and travel time costs associated with placing additional truck traffic onto Minnesota's highway system.

Table 20
Mileage Based Costs Associated with Additional Trucks on MN Highways

Mileage-Based Costs Factors

Vehicle Operating Cost \$/mile (Free Flow)	\$0.95
Vehicle Operating Cost \$/mile (Congested)	\$1.16
Vehicle Operating Cost \$/hour (Congested or Idle)	\$4.62
\$ per Fatalities Accident	\$7,200,000
\$ per Personal Injury Accident	\$92,000
\$ per Prop Damage Accident	\$12,000
Environmental Cost \$/mile (Free Flow)	\$0.05
Environmental Cost \$/mile (Congested)	\$0.07
Environmental Cost \$/hour (Congested or Idle)	\$0.21

Source: TREDIS Data Sources and Default Values, 2010 and Data from Twin Cities Metropolitan Council

Table 21
Hour-Based Costs Associated with Additional Trucks on MN Highways

Hour-Based Cost Factors

Crew Cost Factor (\$ / hr per crew member)	\$17.51
Freight Logistics Factor (\$ / hr per ton)	\$1.59
Buffer Time Cost Factor (\$ / hr per veh-trip)	\$41.88

Source: TREDIS Data Sources and Default Values, 2010 and Data from Twin Cities Metropolitan Council

Subjects for Possible Further Analysis

Several subjects for further analysis were identified and deemed important to fully understand the impact of the potential closure of the Upper St. Anthony Lock.

General Storage Capacity Concerns

During the course of the interviews, concerns were raised about the inability of fertilizer companies to find locations on the river system for additional storage. The loss of a west metro location with a railroad track adjacent to a barge dock wall for delivery of project cargo including process equipment and structural components such as bridge parts should be better understood. There may also be a need/opportunity to replace some of the capacity and special functions provided by the Minneapolis Upper Harbor Terminal including (1) segregated coal storage (2) a large warehouse for cold storage of large or heavy items such as flat steel, machinery and twine.

Loss of Storage Capacity and Critical Changes in the Coal Supply Chain

Eastern coal, used by manufacturers, processors and the energy industry, requires specialized storage conditions. Alternative storage locations in the Twin Cities area are limited and would not replace storage available at the Upper Harbor Terminal. Additional storage capacity is currently being constructed in Winona, Minnesota, but additional transportation and storage costs from Winona may be cost prohibitive for current users. Siting, permitting and financing additional coal storage capacity in the metropolitan area would be challenging. The ability of eastern coal users to adapt to changes in the coal supply chain should be explored. Conversion of boiler systems may be cost prohibitive for some users, especially during difficult economic times. Adapting an existing boiler to a different source of coal can be a sensitive process that requires time. A more in-depth examination of changes to the coal supply chain and impact on users is recommended to avoid serious adverse impacts.

Shipping Contracts

Some contracts related to river shipment of bulk commodities are placed months or years in advance. Bulk commodities move slowly but cost-effectively from mines and processing plants via waterways; closure could impact a shipment already on the river. Legal issues are uncertain, especially because permanent closure of a lock with active commercial navigation is unprecedented according to the Army Corps of Engineers.

Time Sensitivity of Lock Closure

Some of the economic impacts of lock closure may be mitigated with additional time. The timing of lock closure may be a significant variable to addressing issues related to advance commodity supply contracts as well as supply chain impacts driven by losses of storage capacity.

Localized Highway Impacts

The regional transportation impact model used in this analysis does not address traffic congestion that may occur in specific locations. However, it is recommended that on key strategic routes and locations further (micro-simulation) modeling and analysis of delay, noise, emissions and crash risk be conducted to scan for issues that are beyond the resolution or scope of the current study. The objective of further examination would be to identify the scope and magnitude of any specific transportation improvement projects that may be warranted as a consequence of discontinued lock and dam operations. Specific routes include

- Highway 61 exit to Warner Road – Port of Saint Paul
- Lowry Tunnel
- Broadway to Highway 280 to I-94
- I-94 / I-35W commons area south of downtown Minneapolis
- I-94 Mississippi River bridge
- I-94 north of downtown St. Paul.

Appendix 1

Organizations Interviewed

Interviews were completed with the following organizations during the course of this study.

Above the Falls Sports

St. Paul Port Authority

Aggregate Industries

University of Minnesota

Brookfield Power

**Upper Mississippi Waterway
Association**

Cemstone

Upper River Services, Inc.

Marshall Concrete

US Army Corps of Engineers

Minneapolis CPED

Wilderness Inquiry

**Minneapolis Park and Recreation
Board**

Xcel Energy

MnDOT

Minnesota DNR

Mississippi River Partnership

National Park Service

Northern Metal Recycling

Padelford Packet Boat Company

Paradise Charter Cruises

River Services Inc

Appendix 2

Glossary of Terms

Direct Effects – A series of production changes or expenditures made by producers and consumers as a result of an activity or policy (e.g. changes in economic activity in an industry/ies).

Indirect Effects - The impact of local industries buying goods and services from other local industries as the cycle of spending works its way backward through the supply chain until all money leaks from the local economy.

Induced Effects – The re-spending of income by employees of supplier industries (recirculated through the household spending patterns which provide further local economic activity).

Multiplier – A ratio indicating additional spending that occurs in the local economy because of Indirect and Induced spending per unit of Direct spending. Multipliers may be constructed for output, employment, and every component of Value Added.

Output - Output represents the value of industry production. Also known as Business Sales.

Value Added - The difference between an industry's or an establishments total output and the cost of its intermediate inputs. Value added consists of compensation of employees, taxes on production, imports less subsidies, and gross operating surplus.

Wages – Income paid to employees of a firm within an industry.

