The Navigation Economic Technologies Program

September 1, 2005

NETS

navigation · economics · technologies

McAlpine Lock Closure in August 2004

Shipper and Carrier Response Results of Surveys

US Army Corps of Engineers®

IWR Report 05-NETS-R-08

Navigation Economic Technologies

The purpose of the Navigation Economic Technologies (NETS) research program is to develop a standardized and defensible suite of economic tools for navigation improvement evaluation. NETS addresses specific navigation economic evaluation and modeling issues that have been raised inside and outside the Corps and is responsive to our commitment to develop and use peer-reviewed tools, techniques and procedures as expressed in the Civil Works strategic plan. The new tools and techniques developed by the NETS research program are to be based on 1) reviews of economic theory, 2) current practices across the Corps (and elsewhere), 3) data needs and availability, and 4) peer recommendations.

The NETS research program has two focus points: expansion of the body of knowledge about the economics underlying uses of the waterways; and creation of a toolbox of practical planning models, methods and techniques that can be applied to a variety of situations.

Expanding the Body of Knowledge

NETS will strive to expand the available body of knowledge about core concepts underlying navigation economic models through the development of scientific papers and reports. For example, NETS will explore how the economic benefits of building new navigation projects are affected by market conditions and/or changes in shipper behaviors, particularly decisions to switch to non-water modes of transportation. The results of such studies will help Corps planners determine whether their economic models are based on realistic premises.

Creating a Planning Toolbox

The NETS research program will develop a series of practical tools and techniques that can be used by Corps navigation planners. The centerpiece of these efforts will be a suite of simulation models. The suite will include models for forecasting international and domestic traffic flows and how they may change with project improvements. It will also include a regional traffic routing model that identifies the annual quantities from each origin and the routes used to satisfy the forecasted demand at each destination. Finally, the suite will include a microscopic event model that generates and routes individual shipments through a system from commodity origin to destination to evaluate non-structural and reliability based measures.

This suite of economic models will enable Corps planners across the country to develop consistent, accurate, useful and comparable analyses regarding the likely impact of changes to navigation infrastructure or systems.

NETS research has been accomplished by a team of academicians, contractors and Corps employees in consultation with other Federal agencies, including the US DOT and USDA; and the Corps Planning Centers of Expertise for Inland and Deep Draft Navigation.

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Prepared by:

Planning Center of Expertise for Inland Navigation

For the:

Institute for Water Resources
U.S. Army Corps of Engineers
Alexandria, Virginia

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EXECUTIVE SUMMARY

The McAlpine L&D is located in Louisville, Kentucky at Ohio River mile 606.8, roughly two-thirds of the way between the Ohio River's source at Pittsburgh, Pennsylvania and its junction with the Mississippi River near Cairo, Illinois. McAlpine has one operable chamber, its 1200' x 110' main chamber. A new 1200' x 110' chamber is currently being built.

On 20 May 2004 the U.S. Army Corps of Engineers, Chief of Operations Division in the Louisville District, issued a Notice to Navigation Interests, Notice No. 2004-005, that the 1200' x 110' main chamber at McAlpine Lock and Dam would be closed for emergency repairs from 3 August 2004 through 16 August 2004. Diver inspections had revealed cracks in critical structural members, which required repairs to prevent failure of a miter gate. Since McAlpine was currently being operated as a single chamber facility, this meant the Ohio River would be closed to all river traffic at Louisville, Kentucky for approximately two weeks.

As a result of coordination with affected river carriers and river dependent industries, closure dates were slightly adjusted to increase the amount of time available to prepare for the closure, moving the 14 day closure from the originally scheduled 3 August to a start date of 9 August 2004. The U.S. Coast Guard (USCG) also determined to establish a temporary Regulated Navigation Area (RNA) for the Ohio River from mile 531.5 to mile 720.7 for the purpose of controlling vessel operations. This addressed concerns about the potential hazards created by anticipated waterway congestion during and immediately after the McAlpine lock closure. For its part, the towing industry established a Command Center that was to be manned by an industry representative and USCG personnel 24 hours a day, 7 days a week in order to monitor and direct traffic in the RNA.

As recorded in the Corps of Engineers' Lock Performance Monitoring System (LPMS), the 1200' x 110' main chamber at McAlpine Lock and Dam was closed for emergency repairs beginning at 16:57 hours on 8 August 2004 and was reopened at 16:20 hours on 19 August 2004. Thus, the main chamber closure actually lasted 263.4 hours, or approximately 10 days and 23 hours, nearly three days less than originally scheduled. Tow delays during the outage at McAlpine totaled more than 1440 hours.

Using the LPMS data discussed above, delay costs are routinely used to estimate the industry costs associated with a lock closure. Both the Corps and waterway stakeholders recognize that the cost of lock closures extends beyond these directly observable delay costs and that measuring a more complete range of costs is more difficult. This study reports survey results and the results from an industry telephone canvas, both of which begin to assess the wider range of costs associated with a lock closure at McAlpine.

Industry Canvas

The Corps of Engineers' Louisville District held meetings with representatives of the towing industry and their customers. These meetings revealed that many shippers that used McAlpine were, in the near term at least, almost completely dependent on the waterway. Closure of McAlpine would shut off the flow of inputs to their manufacturing facilities, leading to severe disruptions in production to the point of permanent plant closure. The Waterways Council, Inc. (WCI), a national public policy organization that advocates a modern waterway system, conducted a pre-closure and post-closure telephone canvass of waterway users in order to estimate the cost of the McAlpine closure.

In the pre-closure canvass WCI contacted 101 companies to find out how this closure might affect them. Seventy-two companies responded, with 54 indicating they would be negatively affected by the closure. Twenty-four companies, primarily chemical and metal manufacturers, indicated that they would be severely affected, meaning production cutbacks and/or high additional costs. A variety of strategies for coping with the McAlpine closure were being considered. These included: shifting suppliers; off-loading on one side of the lock, trucking around the lock and through Louisville, and then re-loading to barge on the other side of the lock; advanced shipping and stockpiling inventory; and shifting to other modes of delivery. Many of these companies indicated that a closure lasting longer than the planned two weeks would render these plans inoperable and lead to production cutbacks. All respondents indicated that the advance notice of the closure and the slight delay in beginning the closure allowed them to set plans in place for dealing with the service disruption.

Companies were less willing to respond to WCI's post-closure canvas, making it difficult to quantify the actual cost of the closure to shippers. A number of firms responded that the closure of McAlpine had little or no effect on their operations; however, a larger number of firms were affected and they frequently responded in multiple ways. The most common response was shipping ahead of the closure, which often meant changes in production schedules and/or stockpiling. Many companies shifted to another mode of transport, often at higher cost. A number of companies lost sales. Those of the 27 responding firms that provided cost information indicated cost increases of $1,100,630 and lost sales of $665,000. In the post-closure canvas many respondents also expressed frustration with delays in funding the construction of McAlpine, which they felt had left the industry vulnerable to a complete closure of the river.

Corps of Engineers Survey

As a part of this study, the Corps of Engineers prepared a formal survey for both shippers and for waterway carriers. The intent of the survey was to find out what measures were taken by industry to deal with the McAlpine closure and what these actions cost. A total of 60 shippers, accounting for 81 percent of total McAlpine traffic, were selected for the formal shipper survey. Completed survey forms were received from 20 companies accounting for about 42 percent of total traffic. Respondents had a wide variety of reactions to the outage, ranging from no changes in procedures to altering production

during the closure period. The most common response was to stockpile product and wait for McAlpine traffic to clear. Most of the respondents felt that the closure was well-handled, that they had sufficient notification, and that they were able to adjust. Several respondents indicated that their experience with McAlpine caused them to do such things as increase stockpiles and switch to all-overland modes. Shippers responding to the Corps survey reported additional costs and lost sales totaling $2,617,670. It should be noted that these additional costs represent only a partial accounting of total industry costs due to the closure of McAlpine. Many companies declined to participate in the survey, while other companies that did participate in the survey were unable to isolate and provide a complete accounting of their added costs.

In addition to the shipper survey, the Corps surveyed major carriers using the McAlpine facility. The purpose of this survey was to find out what specific measures were taken by carriers to address the McAlpine main chamber closure and to estimate the associated costs. A total of 19 companies were surveyed in this effort. These companies handled a total of 50.2 million tons of McAlpine commodity traffic in 2002, which was about 96 percent of total traffic through the facility. Completed survey forms were received back from ten of the 19 companies, representing a response rate of 53 percent. These ten companies accounted for about 73 percent of the traffic through the McAlpine facility in 2002. Towing companies responding to the carrier survey reported idle or delayed equipment costs of $1,981,000 (approximately $19,000 of which was delay experienced at the lock).

Conclusion

The emergency closure of McAlpine Lock and Dam caused serious disruption to towing companies and the customers they serve. Towing companies experienced traffic delays and idled equipment that cost an estimated $2.7 million dollars, while shippers had $3.7 million in additional costs and $0.7 million in lost sales. The adverse effects reported by survey respondents to the Corps survey and the WCI telephone canvas totaled $6.3 million.

Though these costs are substantial, carriers and shippers indicate that they would have been orders of magnitude higher had advance notice not been received or had the closure been longer than the 11 days the lock was actually closed. With the advance notice of a little more than 2 months, many carriers and shippers were able to shift to an alternate overland mode of transportation and advance ship needed product. Those that did not pursue these two options faced obstacles that could not be overcome, such as long lead times (as much as 90 days) for ordering product and the absence of rail or truck unloading/loading facilities. Carriers altered their operations in response to the closure, generally by working in other parts of the inland waterway system or by taking towboats and barges out of service during the closure.

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McAlpine Lock Closure in August 2004
Shipper and Carrier Response – Results of Surveys

Prepared for the Institute for Water Resources

Prepared by the Planning Center of Expertise
for Inland Navigation

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McAlpine Lock Closure in August 2004
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1. INTRODUCTION

Diver inspections at McAlpine Locks and Dam in April and May 2004 revealed cracks in critical structural members of the miter gates. It was determined that repairs were necessary to prevent failure of the gates and that these repairs would take 14 days to effect. As a result of coordination with affected river carriers and river dependent industries, closure dates were slightly adjusted to increase the amount of time available to prepare for the closure, moving the 14 day closure from the originally schedule August 3rd to a start date of 9 August 2004. During this time, waterborne traffic could not pass this point on the Ohio River.

As recorded in the Corps of Engineers' Lock Performance Monitoring System (LPMS), the 1200' x 110' main chamber at McAlpine Lock and Dam was closed for emergency repairs beginning at 16:57 hours on 8 August 2004 and was reopened at 16:20 hours on 19 August 2004. Thus, the main chamber closure actually lasted 263.4 hours, or approximately 10 days and 23 hours, nearly three days less than originally scheduled. Tow delays during the outage at McAlpine totaled more than 1440 hours. Delay costs are routinely used to estimate the industry costs associated with a lock closure using this tow delay information from LPMS. Both the Corps and waterway stakeholders recognize that the cost of lock closures extends beyond these directly observable delay costs and a more complete accounting of closure costs is difficult. This study reports survey results and the results from an industry telephone canvas that begin to assess the wider range of costs associated with a lock closure at McAlpine.

2. PROJECT DESCRIPTION

The McAlpine Locks and Dam project is located at Ohio River Mile 606.8 in Louisville, Kentucky. Up until 1999, McAlpine had two operating lock chambers, a 1200' x 110' main chamber and a 600' x 110' auxiliary chamber. The auxiliary chamber was closed in 1999 to make way for the construction of a new 1200' x 110' lock chamber. Construction of this new chamber began in 1996 and is scheduled for completion in 2008. Until construction of this new chamber is complete, the existing main chamber services all commercial traffic. Therefore, closure of the main chamber at McAlpine, such as the 11 day closure in 2004, leaves the river impassible in the area.

Commodity traffic through the McAlpine facility for the period 2000-2004 is displayed in **Table 1**. The 2004 traffic mix is dominated by coal (33.1 percent) being moved to electric power generating plants; followed by iron and steel products (19.5 percent) shipped by steel plants in the mid and upper Oho Valleys; chemicals (12 percent); petroleum products (9.2 percent); ores & minerals (7.2 percent); aggregates (6.6 percent); and grains (6.4 percent).

Table 1
Commodity Traffic through the McAlpine Locks, 2000-2004
(Millions of Tons)

	2000	2001	2002	2003	2004	% of Total 2004
Coal	19.1	21.1	18.8	16.0	17.4	33.1%
Petroleum	5.4	5.9	5.1	5.2	4.8	9.2%
Aggregates	4.6	4.3	3.3	2.8	3.5	6.6%
Grains	3.2	3.8	3.0	2.6	3.4	6.4%
Chemicals	6.2	5.7	5.8	6.1	6.3	12.0%
Ores&Minerals	3.6	3.2	3.4	4.4	3.8	7.2%
Iron&Steel	8.2	7.0	8.0	9.1	10.3	19.5%
Others	5.6	5.2	4.3	3.3	3.2	6.0%
Total	55.8	56.2	51.9	49.5	52.7	100.0%

Source: LPMS Data

The overall traffic orientation for 2004 displayed in **Table 2** shows that most traffic through the facility is upbound (68.2 percent). Coal traffic is a little more than half upbound (56.2 percent), while about three quarters of iron and steel traffic moves upbound through McAlpine (77.1 percent). Chemicals traffic is largely upbound (86.3 percent). Petroleum products traffic at McAlpine is a little more than half upbound (58.0 percent). Ores/minerals and aggregates are almost entirely upbound at (94.6 and 94.0 percent, respectively).

Table 2
Commodity Traffic through the McAlpine Locks, by Direction, 2004
(Thousands of Tons)

	Upbound	% of Total	Downbound	% of Total	Total
Coal	9,809	56.2%	7,630	43.8%	17,439
Petroleum	2,806	58.0%	2,030	42.0%	4,836
Aggregates	3,264	94.0%	209	6.0%	3,473
Grains	325	9.7%	3,027	90.3%	3,353
Chemicals	5,451	86.3%	867	13.7%	6,318
Ores&Minerals	3,593	94.6%	205	5.4%	3,798
Iron&Steel	7,937	77.1%	2,353	22.9%	10,290
Others	2,732	86.2%	437	13.8%	3,169
Total	35,917	68.2%	16,759	31.8%	52,676

Source: LPMS Data

3. CHRONOLOGY OF EVENTS

April and May 2004. Diver inspections at McAlpine 1200'main lock revealed cracks in critical structural members, which require repairs to prevent failure of a miter gate.

20 May 2004. Notice to Navigation Interests Notice No. 2004-005 was issued to inform the navigation industry that the main lock chamber at McAlpine would be closed for emergency repairs beginning on (or about) 3 August 2004 and ending on (or about) 16 August 2004. The original scope of work called for dewatering the lock to make structural repairs. Additional diver inspections to monitor the condition of the miter gate will occur every two weeks beginning May 27, 2004.

01 June 2004. Notice to Navigation Interests Notice No. 2004-006 revised the closure start and end dates as a result of coordination with affected river carriers and river dependent industries and response to the initial notice for the McAlpine 1200' lock closure. Closure dates were slightly adjusted to increase the amount of time available to reschedule traffic around the closure. The new schedule indicated that the McAlpine lock would be closed beginning EDT 9 August 2004 and 22 August 2004 for critical repairs to miter gates.

08 August 2004. At 16:57 hours, LPMS data indicate that the main lock chamber at the McAlpine facility closed to navigation. As previously noted, this begins a planned 14-day total river closure since there is no auxiliary lock at McAlpine.

19 August 2004. At 16:20 hours, LPMS data indicate that the main lock chamber at the McAlpine facility reopened to navigation. The closure lasted 10 days and 23.4 hours.

20 August 2004. At 11:40 hours, the delay at the McAlpine facility returned to zero. The total closure-induced delay from the closure event was 1,448 hours. The time required for the delay at McAlpine to return to zero was 19.3 hours. The maximum delay during the closure was 10.7 Days.

4. ADVANCE CLOSURE NOTIFICATION

Advance notification played an important role in minimizing the adverse effects of the closure of McAlpine Locks and Dam. The Corps of Engineers, the U.S. Coast Guard, the towing industry, waterway shippers, and municipal water supply authorities were the principal entities that worked together to minimize the economic effects of the closure of the Ohio River at Louisville, Kentucky and ensure safe operation of both the project and vessels using the project in the days leading up to, during, and after the closure.

a. Coordination and Planning. The Louisville District, US Army Corps of Engineers notified industry of the emergency closure of McAlpine's main (and only) lock chamber in a 20 May 2004 Notice to Navigation Interests, Notice No. 2004-005 (see **Appendix A**). In that notice a tentative schedule for the closure was provided, indicating that the emergency repairs would occur over a 14 day period from 3 August 2004 through 16 August 2004. The Notice indicated that diver inspections had revealed cracks in the miter gates and the district would monitor the gates' condition with bi-weekly diver inspections. If any of these inspections indicated imminent failure, closure could occur sooner.

The district met with representatives of the towing industry and their customers, the U.S Coast Guard (USCG), and local municipal water authorities on 27 May 2004. Many companies indicated near complete dependency on the waterway in the near term. Closure of McAlpine would shut off the flow of inputs to their production processes that would lead to severe disruptions to their production, including permanent plant closure. The USCG was concerned that the closure would result in a highly congested and hazardous situation while tows waited to be locked through, and municipal water suppliers were concerned that waiting tows would inadvertently discharge diesel fuel near water intakes while tied-up waiting for lockage service. All agreed that scheduling critical shipments ahead of the closure and prioritizing lockages once the lock re-opened was desirable. The USCG determined that the area around McAlpine needed to be designated as a regulated navigation area (RNA) until operations returned to normal. The towing industry created a Queue Management Working Group (QMWG).

Subsequent to this 27 May meeting the district revised the closure schedule in order to give shippers more time to arrange other transportation options and ship product in advance of the closure. As announced in Notice No. 2004-006 dated 1 June 2004, closure of the 1200' x 110' lock at McAlpine was now scheduled for 9 August to 22 August 2004. Again, because the 1200' x 110' chamber is McAlpine's only operational lock chamber, this meant the Ohio River would be closed to all waterway traffic at Louisville, Kentucky.

Additional meetings were held in the time leading up to the lock closure. These established a Command Center (CC), lockage policies for vessel operators (including a means of gaining priority lockage once the facility re-opened) and expanded, designated areas for waiting tows. The CC was to be manned 24 hours a day, 7 days a week by a towing industry representative and a member of the USCG. The CC was to communicate with tows as they arrived in the pools above (McAlpine Pool) and below (Cannelton Pool), track, monitor, and provide logistical direction to arriving tows (using the VHS transmitters, the USCG temporary Vessel Tracking System and LPMS data), and oversee the sequencing of tow processing. Again, these efforts were aimed at operating vessels and the project safely during what was expected to be a period of heavy congestion, while acting to minimize economic disruptions the closure would cause.

b. Waterways Council, Inc. Report. Notice of the impending McAlpine closure caused considerable alarm among companies dependent upon the inland waterways. These companies noted that service disruptions at busy inland locks have been

coming with greater frequency and with less advance notice over the past ten years. Closure of McAlpine also represented the first time the Ohio River with its two lock chamber configuration would be closed at any geographic point due to an emergency structural repair. The Waterways Council, Inc. (WCI), a national public policy organization that represents many waterway carriers and advocates a modern waterway system, wanted to know how waterway users would be affected by the closure. They determined to canvas industry prior to the closure to see how they planned to cope and then again after the closure in order to make an estimate of the economic impacts. The results of the pre-closure canvas were compiled and presented by Linare Consulting for WCI in an Interim Report and the post-closure canvas results were presented in a Final Report.[1]

WCI canvassed 74 companies by telephone prior to the closure and found that 54 would be negatively affected by the closure. Closure effects were ranked as Severe, Heavy, Moderate, Possible, or None. Twenty-four companies, primarily chemical and metal manufacturers, were ranked as being heavily or severely affected, meaning production cutbacks and/or high additional costs. It was estimated that nearly two million tons of commerce would be adversely affected. A variety of strategies for coping with the McAlpine closure were being considered. These included: shifting suppliers, off-loading on one side of the lock, trucking around the lock and through Louisville, and then re-loading to barge on the other side of the lock, advanced shipping and stockpiling inventory, and shifting to other modes of delivery. All of these strategies involved additional costs that were not estimated. Many of these companies indicated that a closure lasting longer than the planned two weeks would render these plans inoperable and lead to production cutbacks. All were grateful for the advance notice that allowed them to set plans in place for dealing with the service disruption.

Companies were less willing to respond to WCI's post-closure canvas, making it difficult to quantify the actual cost of the closure to shippers. A number of firms responded that the closure of McAlpine had little of no effect on their operations; however, a larger number of firms were affected and they frequently responded in multiple ways. The most common response was shipping ahead of the closure, which often meant changes in production schedules and/or stockpiling. Many companies shifted to another mode of transport, often at higher cost. A number of companies lost sales. Those of the 27 responding firms that provided cost information indicated cost increases of $1,100,630 and lost sales of $665,000. In the post-closure canvas many respondents also expressed frustration with delays in funding the construction of McAlpine.

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[1] *Interim Report, Study of the Effects on the Economy of the Upcoming Emergency Closure of the McAlpine Lock*, July 21, 2004 and *Final Report, Study of the Effects on the Economy of the Emergency Closure of the McAlpine Lock*, October 2, 2004. Both reports were prepared by Linare Consulting for Waterways Council, Inc. Further information on this report may be obtained by contacting dcolbert@vesselalliance.com.

[3] Of this $1,981,000, approximately $19,000 of this is delay or idle that occurred while the tow was at the lock. This $19,000 in lock delay cost was excluded from the survey results as it is captured through analysis of the Lock Performance Monitoring System data. Delay costs are reported in *Event Study of the August 2004 McAlpine Lock Closure*, which was prepared by the US Army Corps of Engineers' Planning Center of Expertise for Inland Navigation for the Institute for Water Resources (IWR). The report is available on IWR's Navigation Economic Technologies (NETS) website (http://www.corpsnets.us/).

5. SHIPPER SURVEY

a. Survey Procedures. An OMB-approved Shipper Survey (Control #0710-0001) was used to capture and evaluate shipper reactions to the closure of the main chamber at McAlpine lock (see **Appendix B**). Shippers were defined as companies that receive commodity traffic transiting McAlpine. The formal shipper survey was conducted between 1 March and 30 April 2005. The purposes of the survey were to find out what measures were taken by industry to mitigate the effects of the main chamber closure at McAlpine and to estimate the total costs to industry that resulted from the closure event. A wide range of survey responses was anticipated based on such factors as companies' intensity and frequency of usage of the McAlpine facility; the time of year of the closure; the companies' transportation options; and the nature of the businesses.

At the outset of the process, several steps were adopted for including firms in the survey. First of all, a list was compiled that shows the parent companies for the McAlpine receiving docks along with the total tonnage in 2002. The parent company (e.g., owner) of each McAlpine receiving dock was first identified, and then receiving docks were grouped by their parent companies and their corresponding tonnages were summed. The parent companies were then ranked in descending order by their total tonnage received. Fourteen companies received 1,000,000 tons or more and 60 companies received 100,000 tons or more. All of these companies were included in the mail survey. Waterborne Commerce Statistics Center (WCSC) data for 2002 was used in assembling basic shipper and carrier data. All of the contact information for the top ranking companies was determined by comparing several contact lists. Contact lists included; a pre-closure survey; *Waterways Council Canvas of Users of the McAlpine Lock*, compiled with the assistance of various stakeholders and prepared by Linare Consulting dated July 15, 2004; a list of industry meeting attendees at the pre-closure McAlpine meeting that took place May 27, 2004; and contact information provided by the Navigation Planning Center in Huntington, WV. In the absence of any contact information, the Internet was used as a search tool to verify correct contact information for these parent companies. In addition to the major shippers at the McAlpine lock, the top 20 carriers at McAlpine in 2002 were identified and contact information verified. The 60 shippers and 20 carriers were sent a mail survey followed by a telephone follow-up if the parent company or carrier sent no response after two weeks.

Sixty companies were selected for survey as a part of the formal shipper survey and 20 carriers as part of the formal carrier survey. Surveyed shipper companies handled about 82 percent of total traffic. Completed survey forms were received from 20 companies, representing a response rate of 33 percent and accounting for 42 percent of McAlpine's total 2002 traffic. A listing of the types of responding companies is provided in **Table 4**.

b. Shipper Survey Questionnaire Responses. Actual survey questions and response summaries are provided in italics in the following paragraphs. Please note that only survey questions that generated responses are included. Other questions are skipped.

General Description of Firm and Products Produced:

Response(R). The majority of the companies that responded to this shipper survey indicated that the commodities they ship/receive through the McAlpine lock comprise mostly coal, steel, petroleum, and grain products. These commodities account for 84 percent of the respondent tonnage with 40 percent attributed to coal receipts, 26 percent is steel, 26 percent is petroleum, and only 8 percent is grain products. The remaining respondent tonnage that transits the McAlpine lock is attributed to chemicals, asphalt, iron ore, and aggregates.

Q1. Did your company have sufficient notice of the scheduled McAlpine closure to prepare a response plan?

R1. ***Table 3*** *shows all 20 of the responding companies provided a response of some kind to this question and 19 of the companies (95 percent) indicated that notification was sufficient to prepare a response. Two companies, one in the petroleum industry and one chemical company, felt the notice gave them ample time to plan accordingly. One coal company indicated that they rescheduled shipments above and below the McAlpine lock for their other plants. A steel company said the problem with the closure was a shortage of products that made inventory build-up is impossible. One company indicated that sufficient notice was received from the barge lines; however, there is still insufficient time to prepare for the closure because it all depends when vessels are scheduled and/or arrive in New Orleans.*

Table 3
Response Summary Shipper Survey Question 1

Response	Count	Percent
Yes	19	95
No	1	5
Total	20	100

Q2. During the period of closure of the lock chamber at McAlpine, what was your company's response?

R2. ***Table 4*** *shows the shippers responses to question 2.*

Responses to this question were provided by 19 of the 20 companies giving a 95 percent response rate. Seven of the companies indicated that they had pursued multiple courses of action during the closure period. The most frequently cited a course of action was no change in procedures and stockpiling product and waiting for the McAlpine traffic to clear. The Third most common response that was indicated by five companies was to switch to overland mode for product delivery. Two of the companies, one steel and one chemical company, switched to rail but mentioned that rail would not be sufficient in the long run to keep their product moving due to the increased expense. Another company

kept their material in barges because all the other options were more expensive. One petroleum company indicated that product originally shipped both via barge & pipeline is now being delivered solely by pipeline. A concrete/aggregate company indicated their sales were affected because they ran out of certain raw materials.

Table 4
Response Summary Shipper Survey Question 2

Number of Responses	Response Category	Types of Commodities Handled at Responding Companies
6	No change in procedures.	Grain; fertilizer; steel; salt; terminaling/warehousing; coal; soy processing/grain exporting; soybean meal & soy oil; trading company distributing pig iron to steel & foundries.
7	Stockpiled product and waited for McAlpine to reopen.	Structural steel beams; Receive, store, and distribute gasoline, diesel, and jet fuel; Refining, marketing, and transportation; Coal Supply; Asphalt Paving Company; Two River dock. Fleeting, warehousing Resell yard for aggregates.
5	Switched to all-overland mode for product delivery from existing sources.	Structural steel beams; On shore Refined Petroleum Products handling and storage facility (excluding production); Steel products, integrated steel mill; Acetone Producer (receive feedstocks from gulf coast); iron or steel coils.
2	Switched to different waterway routing for product delivery from existing sources.	Gas & Electric (move coal by Barge); Coal Supply company
1	Switched product source to an entirely new source.	Utility – Electricity
0	Ceased operations during the period of closure.	
3	Altered production during the period of closure.	De-Icing Salt, Steel, Coke, Grain & Feed Product; Acetone Producer; Asphalt Paving Company
2	Switched production to another facility.	Refining, marketing, and transportation; Acetone Producer.
0	Purchased intermediate or final product, rather than produced.	
2	Other or combinations of the above.	Structural steel beams; On shore Refined Petroleum Products handling and storage facility.
1	No answer.	

Other Comments:

- *Stockpiled product and also switched some product to rail/truck delivery (steel company)*
- *When locks went down all product deliveries were switched from barge and pipeline to solely pipeline (petroleum handling & storage facility).*
- *We did rail – but rail was very expensive and would never been enough to keep us operating (steel mill).*
- *Switched customer bases among production sites. Received product via rail as opposed to barge (chemical company).*
- *Our sales of limestone materials were affected, because we ran out of certain materials (fleeting/warehousing)*
- *Due to our customer base, we decided to keep the material in the barges, since all other options were more expensive (trading company).*

Q3. Which of your commodities and tonnages were affected by this closure?

R3. Of the 20 companies responding to the survey, 19 companies provided an answer giving a 95 percent response rate. Five companies cited no commodities were affected because they were able to plan ahead. Out of these five companies unaffected, one coal company mentioned they were able to switch suppliers between plants above and below the McAlpine lock. One general cargo terminal company was unaffected because this was their slow time of the year and they had space because they were forewarned of the closure. Another company stockpiled petroleum products and waited for McAlpine to open. One general cargo company had no change in procedures.

Table 5 *shows the other 14 companies responding to the survey, indicated that one or more commodities were affected by the McAlpine closure. One general cargo terminal company cited several commodities including highway deicing salt, steel, coke, grain & feed products were delayed but did not give an estimated tonnage level. Three steel companies were affected by the McAlpine closure. One steel company replied that approximately 8 -12,000 tons of steel beams that comprised about 5-10 barges were stockpiled and switched some product to rail/truck delivery. While another steel company noted that iron ore and lime were switched from barge to rail but gave no estimated tonnages. The other steel company that produces iron and steel coils said all of their commodities were switched to the overland mode for product delivery but again gave no estimated tonnages. One petroleum company mentioned their diesel products were affected because they had to stockpile an additional 4,000 barrels of fuel in a storage bank and switched product delivery from barge & pipeline to exclusively pipeline. Coal was affected for three coal companies, one cited they switched the product source to an entirely new source, approximately 25,000 tons of coal was affected. While another company had to stockpile and switch to different waterway routing for product delivery for approximately 30,000 tons of coal. The third coal company switched suppliers between the power plants above and below the lock. An asphalt company cited 38,000 tons of crushed stone had to be stockpiled and altered production during the 11 day closure. An*

aluminum company indicated it had stockpiled, indicating that without its critical feedstock, the plant would likely have been permanently closed. Lastly, an aggregate company mentioned that their limestone was stockpiled to offset the closure but lost sales because they ran out of inventory. A chemical company cited that acetone shipments and cumin receipts were affected because some product was switched from barge to rail and produced at another facility.

Table 5
Response Summary Shipper Survey Question 3

Commodities Affected	Tonnages Affected	Type of Facility
Hi-way Deicing salt, steel, coke, Grain & Feed products		General Cargo Terminal
coal suppliers		Gas & Electric Company
Structured Steel Beams	8,000 – 12,000 Tons (approx. 5 – 10 barges)	Steel Corporation
Fertilizer, Grain, Steel, & Salt		General Cargo Terminal
Flat rolled Steel		Terminal/warehouse
diesel	4,000 barrels	Refined Petroleum handling & storage facility
Iron ore, lime		Steel Mill
Coal	25,000 tons	Utility – Electricity Company
Acetone, cumin		Chemical Company
Coal	30,000 tons	Coal supplier
Pig Iron	25,000 MTons	Trading Company
Iron and Steel Coils		Steel Mill
Crush stone	38,000 tons	Asphalt Paving Company
Alumina		Aluminum smelter
Limestone		River dock

Additional Comments:

- *All commodities were delayed.*
- *We have power plants above and below the McAlpine lock and have coal suppliers above and below the lock. We were able to switch our suppliers between the plants.*
- *This was our slow time of year, we had space because of knowing of closure.*
- *All products were scheduled but product was on hand to wait out delays.*
- *None – we were able to plan ahead.*
- *N/A*

Q4. If a reasonable estimate can be made, what additional costs (over and above normal operations) did you incur as a result of the closure event at McAlpine? If possible, please itemize according to the categories in question 2.

R4. ***Table 6*** *shows a total of 20 shippers responding to the survey. Three coal companies accounted for 45 percent or almost half of the total respondent tonnage. The other half of the total respondent tonnage or 44 percent was attributed to three steel and three*

petroleum companies accounting for 22 percent each of the respondent tonnage. The remaining 12 percent was attributed to five general cargo terminals, one chemical company, one aluminum company, and one concrete/aggregate company which accounted for 7, 2, ? and 3 percent of the total respondent tonnage, respectively.

Table 6
Companies Responding to the Shipper Survey

Company Type	Number Surveyed	Number Responding	% of Respondent Tonnage
Electric Utilities	2	0	0%
Steel Companies	7	3	22%
Petroleum/Asphalt Companies	7	4	22%
Chemical Companies	5	1	2%
General Cargo Terminals	19	5	7%
Concrete/Aggregates Companies	3	1	3%
Coal Companies/Docks	14	3	45%
Other	3	2	0%
Total	60	19	100%

Several companies cited they incurred significant costs due to the McAlpine closure of August 2004 but were unable or hesitant to provide actual dollar cost amount. The majority of the unknown survey costs associated with the closure was due to six companies that stated they stockpiled product and waited for McAlpine to reopen. Of these six companies, three were petroleum companies and the remaining three companies comprised of one steel, one coal, and one other company. Two coal companies cited that incurred considerable costs due to switching from waterway mode to rail/truck modes of transportation. A petroleum and chemical company indicated they incurred significant costs due to a shift in production to another facility but did not give a cost estimate. The other unknown costs were attributed to a coal company that switched product to a new source and a petroleum company that switched from waterway to pipeline mode of transportation.

The total shipper costs due to the McAlpine closure were estimated to be $2.6 million plus these unknown costs. The largest portion of this added cost is attributed to a steel company switching from the waterway to overland (rail) transportation. Another significant closure cost stated in the shipper survey was $220,000 in demurrage and carrying costs. An aggregate company stated they lost over $40,800 in sales due to a shortage of material on hand. One of the general cargo terminal companies altered production during the closure at a cost of $10,000 - $15,000, while another general cargo company experienced a proportionate loss of revenue due to a delay in barge deliveries. Another company cited costs of $175/barge/day for distributing material to steel mills. This cost was not included in the total estimated shipper costs because the number of

barges per day was not given by the shipper in the survey. One coal and one steel company noted that the additional costs are difficult to figure, and thus, a reasonable estimate cannot be made.

Q5. Has the closure at McAlpine caused your company to alter its long-term transportation strategy (e.g. switch to all-overland modes, increase stockpiles, etc.)? How will this impact your total commodity transportation or other costs (per year)? Please explain.

R5. Out of the 20 companies that responded to the shipper survey, 19 replied to question 5 for a 95 percent response rate. 17 companies out of the 18 that responded indicated that the McAlpine closure would not alter their long-term transportation strategy. One company indicated that the river was the only economic transport mode for critical inputs to the plan and that any failure affected the economic life of the plant. One company did not respond. In the short term, during the lock closure, one coal company was able to switch suppliers above and below the McAlpine lock while a petroleum company was able to stockpile enough products to get through the closure period. Another petroleum company was able to switch production temporarily to another facility. A chemical company indicated they were able to return to normal operations after the closure. A general cargo company cited they stopped shipping bulk commodities north of McAlpine lock during the closure and this had no additional financial cost and continued to resume normal operations after the closure. One petroleum/asphalt company mentioned there will be no changes in the long-run but the commodity used at their facility can only economically be transported by barge from the quarries. A concrete/aggregate company indicated that in the long term their commodity cannot be shipped via rail/truck long haul because of the low dollar material being shipped. A steel company mentioned they are supplied solely by barges. Another company stated the closure won't change their long-term transportation strategy, but they need to be aware of upcoming closures in order to keep the customer informed.

Q6. Has the closure at McAlpine caused your company to take any other long-term permanent measures? (switch production to another facility, purchase intermediate or final product rather than produce, etc) Please explain. How will this affect your company's long-term operating costs (per year)?

R6. Out of the 20 survey respondents, 18 answered question 6 for a 90 percent response rate. The 18 companies that responded stated that there will be "No" long-term permanent measures but one chemical company indicated that as long as they continue to receive sufficient notice, alterations can be made to accommodate short-term closures, however, closures increase shipper costs considerably.

Q7. Has your company been impacted by other navigation system disruptions? Did they influence your response to the McAlpine closure?

R7. Out of the 20 respondents, 15 responded to question number seven which is a 75 percent response rate. One general cargo terminal company indicated that the McAlpine

closure was not necessarily disruptive, but the entire Ohio River shut down was a major impact to their operations. Four companies that comprised two coal companies, one steel company, and one asphalt company cited that the Belleville lock and dam closure resulted in major disruptions. A coal company stated that they have large amount of contract coal above the McAlpine lock and need to increase tonnage receipts after the closure to compensate for lost tonnage receipts during the closure. A steel company had to reduce production and several commodities to include coal, iron ore, and lime were in short supply. An asphalt company mentioned that the Belleville lock and dam loss of pool caused bank failure along their plant property and estimated the cost to correct this failure at $150,000. In addition to the Belleville closure disruptions, three companies, two general cargo and one steel company, responded that "Yes" they have been impacted by other navigation system disruptions, but having experienced such disruptions, allowed us to respond more quickly and efficiently and prepared us for the recent McAlpine closure. Another general cargo terminal company mentioned that the New Orleans/Baton Rouge flooding affected their company, but did not state specifically how the company was affected. Another company said they have been impacted by other disruptions, but these closures did not influence their response during the McAlpine closure. Conversely, three companies, one petroleum, one steel, and one coal company cited that "No" previous navigation closures did not influence their response to the McAlpine closure.

Q8. Other Comments.

R8. Six shippers provided additional comments to the shipper survey. Among the shippers responding, comments varied significantly. Two steel companies mentioned that the river is vital to their operations and one steel company added that they ship and receive approximately 100 barges per month, and thus, this closure impacted them and their barge carriers. Two companies, one petroleum and another company, indicated that the closure had little negative effect on their operations due to sufficient advance notice they were able to evaluate their requirements and adjust operations during the closure period to meet their needs. Still, another company mentioned that the navigation system should always be working by keeping alternative locks open while undergoing repairs because a total river closure is a tremendous problem and results in significant cost increases.

6. CARRIER SURVEY

a. Survey Procedures. The OMB-approved Carrier Survey (Control #0710-0001) was targeted to the major towing companies that normally use McAlpine lock (see **Appendix B**). The purpose of this survey was to identify carrier reactions to the closure of the main chamber at McAlpine. Like the shipper survey, the formal carrier survey was conducted between 1 March and 30 April 2005. The purposes of the survey were to find out what measures were taken specifically by the carriers to adapt to the main chamber closure at McAlpine and to estimate the total costs incurred by them as a result of the closure event.

The firms included in the carrier survey were the 20 largest users of the McAlpine facility in tonnage terms for year 2002. The companies that were sent a survey moved a total of

52.2 million tons through the McAlpine project in 2002, which was about 96 percent of total traffic. Completed survey forms were received from ten companies, representing a response rate of 50 percent. Responding companies moved about 38.0 million tons of traffic through McAlpine in 2002, representing about 73 percent of total traffic.

b. Survey Questionnaire Responses. Like the shipper survey results, actual survey questions and response summaries are provided in the following paragraphs. Please note as well that only survey questions that generated responses are included and that other questions are skipped.

Q1. Did your company have sufficient notice of the scheduled closure at McAlpine to prepare a response plan?

R1. ***Table 7*** *shows out of the 10 companies that responded, 9 companies responded to this question, for a 90 percent response rate. Eight of the carriers answered "Yes" they had sufficient notice to prepare a response plan while only one carrier answered "No" they didn't have sufficient notice. Three companies mentioned that the ten-week notice of the McAlpine closure was well enough in advance to plan accordingly and one company even stated that the closure of McAlpine was the best planned, executed, and communicated lock closure in the entire river system. Another company indicated that they notified their customers that they would not operate in the area until the locks were open.*

Table 7
Response Summary Carrier Survey Question 1

Response	Count	Percent
Yes	8	80
No	1	10
No Answer	1	10
Total	10	100

Q2. How did your company operate during the scheduled main chamber outage at McAlpine? Check as many items as are applicable and explain any unusual procedures.

R2. The intent of this question is to gather information on specific courses of action taken by the carriers during the scheduled McAlpine lock closure. ***Table 8*** *shows all of the companies involved answered this question and all pursued multiple courses of action. Eight out of the ten companies that responded cited the barges were tied up at fleeting areas, while the towboats operated elsewhere in the system. One of these same companies mentioned that lost barge days resulted in lost revenues due to the barges sitting and awaiting completion of the emergency repairs at McAlpine. Two out of these same eight companies stated that some of the towboats also remained in queue with the barges. Five out of these eight companies indicated that they avoided the lock when possible. One of these same companies stated that loadings were stopped well in advance of the outage, so very few cargoes were stranded and waiting to go through McAlpine. The remaining two companies did not operate during the McAlpine closure.*

Table 8
Response Summary Carrier Survey Question 2

Number of Responses	Response Category	Types of Commodities Handled at Responding Companies
8	Barges were tied up at fleeting areas; towboats operated elsewhere in the system	All commodities: dry and liquid cargoes; petroleum based products; coal; limestone; sand; gravel; iron ore, alumina, coke, stone, scrap iron, and various petrochemicals; chemicals; steel products, fertilizer, grain.
2	Towboats remained in queue with barges	General Cargo; liquid cargo.
0	Towboats (light) held positions in queue.	
5	Company avoided the lock when possible.	Dry and Liquid cargoes including coal, iron ore, alumina, coke, stone, scrap iron, various petrochemicals, limestone, sand, gravel, steel products, fertilizer, and grain.
2	Other (please explain)-see below	Petroleum products, bulk commodities.

Other (please explain):

- *We did not operate in this area during this time (petroleum products).*
- *Kept our equipment out of this area (bulk commodities).*

Additional Comments:

- *Loadings were planned to be stopped well in advance of the outage. Very few cargoes were stranded needing to go through McAlpine (Dry and Liquid cargoes: coal, iron ore, alumina, coke, stone, scrap iron, and various petrochemicals)*
- *Barge days and thus revenue opportunities were lost as the barges sat "on station" awaiting completion of the work (petroleum based products, chemicals and coal)*

Q3. If a reasonable estimate can be made, what additional costs (over and above normal operations) did you incur as a result of the closure event at McAlpine? If a reasonable estimate can be made, what additional costs (over and above normal operations) did you incur as a result of the closure event at McAlpine?

*R3. The total costs from the carrier survey are estimated to be $1,981,000 (see **Table 9**).*[3] *Nine out of the ten companies responded to question 3. Four out of the nine these companies that responded indicated that the McAlpine closure event did not incur additional costs due to advance notice and careful advance planning. The other four out of the nine companies indicated that they incurred a substantial loss of revenue but only two provided an estimate. One company stated that loss of revenue was mainly due to fleeting charges for barges that were tied-up and remained unoccupied during the closure. The majority of loss of revenue for these companies was because of additional barge delays and fleeting and operating costs. Of these four companies that incurred revenue*

loss, two companies actually provided an estimation of the additional cost they incurred. One company cited that the McAlpine lock closure cost them $542,000 as a result of stopping, waiting, and diverting tows during the closure. While, another company cited that the McAlpine closure event cost them $1,419,890 because of barge delays and lost barges days. One company incurred a tremendous loss of revenue due to additional fleeting and shifting of delayed barges and operating costs for boats trapped above the lock.

Table 9
McAlpine Closure Costs Identified during Carrier Survey

Costs During Scheduled Closure	Type of Cost	Types of Commodities Handled at Responding Companies
diminimus	unknown	petroleum products
unknown	Fleeting costs & loss of revenues	Coal, limestone, sand, gravel
-	-	petroleum products
$1,439,000	delay	all commodities
minimal	unknown	Dry and Liquid cargoes including coal, iron ore, alumina, coke, stone, scrap iron, and various petrochemicals.
tremendous	loss of revenue, delay, & fleeting/operating costs	petroleum based products, chemicals and coal.
-	-	General Dry Cargo, liquid cargo
insignificant	-	bulk commodities.
no response	-	Dry cargo, coal, steel products, fertilizer, grain.
$542,000	Stopping, waiting, & diverting tows	liquid cargos.
$1,981,000	Total known Costs	

Additional Comments:

- *Financial impact was minimal due to careful advance planning with our customers (dry and liquid cargoes)*
- *In addition to a tremendous amount of lost revenues, we experienced additional fleeting and shifting for delayed barges and operating costs for boats trapped above the lock (petroleum based products, chemicals and coal)*

Q4. Prior to the outage at McAlpine, towing industry representatives, in cooperation with the Corps of Engineers, developed some operating procedures that were put in place at the time of the closure. Do you believe this effort was (a) effective (b) ineffective or (c) only partially effective? (Please explain)

R4. Nine out of the ten companies responded to question #4. ***Table 10*** *shows the results of eight out of the nine companies that stated the operating procedures that the towing industry and Corps of Engineers put together for the closure period was extremely effective. Although, one company indicated they were not sure what procedures were put into place. One company indicated that the planning and communication process was*

extremely effective and that prior planning as to what work had to be accomplished and how it would be accomplished was a critical element to minimize the closure time. This same company cited they pre-positioned equipment on lock walls to minimize lock outage time. Another company implemented plans to minimize the need to transit the lock at the beginning of repairs. Two companies stated that the Corps procedures were very effective in returning navigation to the Ohio River once repairs at McAlpine were completed. Lastly, one company had complained that the Corps "must bear the burden of responsibility for not sufficiently funding the alternative chamber renovations".

Table 10
Response Summary Carrier Survey Question 4

Rating	Additional comments	Types of Commodities Handled
Effective		Petroleum products
Effective		Coal, limestone, sand, gravel
Extremely Effective	Planning & communication process was extremely effective. Prior planning as to what work had to be accomplished and how it would be accomplished was a critical element to minimize the closure time. Pre-positioning equipment on lock walls was also critical to minimize lock outage time.	all commodities
Effective	We implemented plans to minimize the need to transit the lock at the beginning of repairs. Corps procedures worked well to ensure an orderly re-opening once repairs were completed.	Dry and Liquid cargoes including coal, iron ore, alumina, coke, stone, scrap iron, and various petrochemicals.
Effective	Yes, they were effective and the restart went off very smoothly	petroleum based products, chemicals and coal.
Effective	For our company notification was more than adequate.	Barge Line operating the inland waterway transporting bulk commodities
Effective	The effort was effective in bringing some order to the outage. However, the Corps must bear the burden of responsibility for not sufficiently funding the alternate chamber renovations.	Dry cargo, coal, steel products, fertilizer, grain.
Effective	Yes, the work that the Corps did in cooperation with industry was very effective in returning navigation to the Ohio River.	liquid cargo.
No Response		Petroleum products

Unrated comment included for the record are:

- *Not sure what procedures were put in place (general dry cargo, liquid cargo)*

Q5. Did the experience with the outage at McAlpine cause your company to adopt any new operating procedures to accommodate lock outages elsewhere in the system? (Please explain.)

R5. Eight of the ten companies responded to Question 5 which accounted for an 80 percent response rate. Three of these eight companies said "Yes" they adopted new

operating procedures to accommodate lock outages while four of these companies said "No" new operating procedures emerged. One petroleum company is concerned with the long term reliability of the river infrastructure and is in the process of developing enhanced contingency plans to deal with river shutdowns in the future. Another company that carries coal, limestone, sand, and gravel indicated they will not expend company resources of boats, barges, and personnel and, instead will not operate during disruptive closures. Another carrier that ships commodities of petroleum products, chemicals and coal indicated they instituted new planning mechanisms with their customers to ensure they had adequate product supply during the closure and mentioned that the McAlpine closure created imbalances in the transportation system that took considerable time to correct. On the other hand, one company stated that the Corps adequately provided timely notification of lock closure for industry preparedness, and thus, minimal impact due to the lock outage. Lastly, a general cargo carrier mentioned the Corps needs to continue to keep carriers informed of upcoming lock closures with advance notices and formal meetings.

7. SUMMARY OF SURVEY AND CANVAS RESULTS

Twenty-seven firms responded to the WCI post-closure telephone canvas. Those that provided cost information indicated cost increases of $1,100,630 and lost sales of $665,000 (see **Table 11**). In the post-closure canvas many respondents expressed frustration with delays in funding the construction of McAlpine, which they felt had left the industry increasingly vulnerable to a complete closure of the river.

Table 11
Survey and WCI Canvas Results

	Corps Survey		WCI Canvas		
	Responses	**Added costs**	**Responses**	**Added costs**	**Total**
No / little effect	6	$ -	8	$ -	$ -
Stockpiling	6	$ -	4	$ 179,750	$ 179,750
Mode shift	6	$ 2,311,871	8	$ 350,881	$ 2,662,752
Waterway route shift	2	$ -	0	$ -	$ -
Altered delivery / production schedules	3	$ 10,000	12	$ 525,000	$ 535,000
Demurrage	1	$ 220,000	2	$ 10,000	$ 230,000
Other costs	1	$ 35,000	0	$ 35,000	$ 70,000
Lost sales	1	$ 40,800	9	$ 665,000	$ 705,800
Vessel delays	2	$ 1,961,896	0	$ -	$ 1,961,896
TOTAL		**$ 4,579,567**		**$ 1,765,631**	**$ 6,345,198**

Note: Any double counting between surveys has been accounted for in the figures presented.

The Corps selected 60 waterway shippers, accounting for 81 percent of total McAlpine traffic, for the formal shipper survey. Responses with varying degrees of information were received from 20 companies accounting for about 42 percent of total traffic. Respondents had a wide variety of reactions to the outage, ranging from no changes in procedures to altering production during the closure period. The most common response was to stockpile product and wait for McAlpine traffic to clear. Most of the respondents

felt that the closure was well-handled, that they had received sufficient notification, and that they were able to adjust. Several respondents indicated that their experience with McAlpine caused them to do such things as increase stockpiles and switch to all-overland mode. Shippers providing cost information in their survey responses reported additional costs and lost sales totaling $2,617,671. It should be noted that these additional costs represent only a partial accounting of total industry costs due to the closure of McAlpine. Many companies declined to participate in the survey, while other companies that did participate in the survey were unable to isolate and provide their added costs.

In addition to the shipper survey, a survey of the major carriers using the McAlpine facility was conducted. A total of 19 companies accounting for 50.2 million tons (96 percent) of McAlpine traffic were surveyed. Completed survey forms were received back from ten of the 19 companies, representing a response rate of 53 percent. These ten companies accounted for about 73 percent of the traffic through the McAlpine facility in 2002. Towing companies responding to the carrier survey reported idle or delayed equipment costs of $1,981,000. Respondents indicated delay costs incurred at the lock of approximately $19,000. These were deducted from the costs reported in this report as these costs are accounted for through analysis of LPMS data.

8. **FINDINGS AND CONCLUSIONS**

Using the LPMS data on tows and delay hours, delay costs are routinely used to estimate industry costs associated with a lock closure (see **Appendix C**). While this is important information on closure costs, both the Corps and waterway stakeholders recognize that the cost of lock closures extends beyond these directly observable delay costs. This study used surveys and the results of an industry telephone canvas of shippers and carriers to begin measuring a more complete range of costs associated with the 11 day closure of McAlpine.

The surveys and telephone canvas indicate that the emergency closure of McAlpine Lock and Dam caused serious disruption to towing companies and the customers they serve. Towing companies experienced idled equipment costs of $2.7 million dollars, while shippers incurred $3.5 million in additional costs and $0.7 million in lost sales. The adverse effects reported totaled $6.3 million (see **Table 12**). The combined WCI canvas and Corps survey received responses from shippers that accounted for 27.4 million of the 52.7 million tons (52.0 percent) that moved through McAlpine in 2004. So while the response could be called representative, it does not account for total private costs associated with this closure.

Though these costs are substantial, carriers and shippers indicate that they would have been orders of magnitude higher had advance notice not been received or had the closure been longer than the 11 days the lock was actually out of service. With an advance notice of a little more than two months, many shippers were able to shift to an alternate overland mode of transportation and advance ship needed product. Those that did not pursue these two options faced obstacles that could not be overcome, such as long lead times (as much as 90 days) for advance ordering of product and/or the absence of rail or truck

unloading/loading facilities. Carriers altered their operations in response to the closure, too. Companies responding to the survey indicated that they stayed away from McAlpine once it was closed. They tied-up towboats and barges in fleeting areas or tried to operate elsewhere in the inland navigation system. Only two of the 10 responding towing companies indicated that they had any of their tows in queue waiting for the lock to reopen.

Table 12
Summary of Closure Responses and Added Costs

Closure Response	Total	
	Responses	Added cost
No / little effect	14	$ -
Stockpiling	10	$ 179,750
Mode shift	14	$ 2,662,752
Waterway route shift	2	$ -
Altered delivery / production schedules	15	$ 535,000
Demurrage	3	$ 230,000
Other costs	1	$ 70,000
Lost sales	10	$ 705,800
Vessel delays	2	$ 1,961,896
TOTAL	**71**	**$ 6,345,198**

Note: Any double counting between surveys has been accounted for in the figures presented.

A Appendix:

Notices To Navigation Interests

US Army Corps of Engineers
Louisville District

Notice to Navigation Interests

Notice No. 2004-005 Date: 20-MAY-2004

http://www.lrl.usace.army.mil/or/text/nav_notice.htm
In Reply Refer to:
CELRL-OP-TM P.O. Box 59, Louisville, KY 40201-0059 (502) 315-6703
http://infoport.lrh.usace.army.mil

LOUISVILLE DISTRICT

McALPINE LOCKS AND DAM

1200' CHAMBER CLOSURE

OHIO RIVER MILE 606.8

1. McAlpine Locks and Dam (Mile 606.8) The 1200-foot lock chamber is now being scheduled for emergency repairs from **August 3, 2004 through August 16, 2004**. Since this is the only lock chamber at McAlpine this will be a **total river closure for 14 days.** During this period, a repair crew will dewater the lock to make structural repairs. Shippers are strongly urged to coordinate with all effected river related industries and to re-schedule shipments in advance of or after the closure to the extent practical.

2. Diver inspections have revealed cracks in critical structural members, which require repairs to prevent failure of a miter gate. Additional diver inspections to monitor the condition of the miter gate will occur every two weeks beginning May 27, 2004. These diver inspections may identify the need for an earlier closure if failure is imminent.

3. Comments related to the schedule can be directed to the undersigned or to Colonel Robert Rowlette, District Commander at (502/315-6102) or Robert.A.Rowlette@lrl02.usace.army.mil. The schedule has been established weighing both adequate notice to river users and potential risk of gate failure.

Robert G. Fuller
Ch. Operations Division
Phone: (502) 315-6731
Robert.G.Fuller@lrl02.usace.army.mil

US Army Corps of Engineers
Louisville District

Notice to Navigation Interests

Notice No. 2004-006 Date: 01-June-2004

http://www.lrl.usace.army.mil/or/text/nav_notice.htm
In Reply Refer to:
CELRL-OP-TM P.O. Box 59, Louisville, KY 40201-0059 (502) 315-6703
http://infoport.lrh.usace.army.mil

LOUISVILLE DISTRICT

REVISED

McALPINE LOCK AND DAM

1200' CHAMBER AND OHIO RIVER CLOSURE

OHIO RIVER MILE 606.8

1. McAlpine Locks and Dam (Mile 606.8) As a result of coordination with affected river carriers and river dependant industries and response to the initial notice for the McAlpine 1200' lock closure; closure dates have been slightly adjusted to increase the amount of time available to reschedule traffic around the closure. The McAlpine Lock will be closed beginning 0800 EDT **August 9, 2004 through August 22, 2004** for critical repairs to miter gates.

2. As previously noted, this will be a 14 day total river closure since there is **no auxiliary lock** at McAlpine. Ongoing periodic diving inspections may identify the need for an earlier closure if failure is imminent.

3. In addition, due to concerns regarding congestion leading up to the McAlpine closure, the previously scheduled July 7, 2004 through July 24, 2004 main chamber closure at Cannelton Locks and Dam, mile 720.7 is cancelled.

4. Comments related to the closure can be addressed to the Louisville District website, http://www.lrl.usace.army.mil/ and click on McAlpine Lock Closure. We expect that continuous close coordination, planning and resolution of issues associated with this closure will take place in the coming weeks ahead and river interests are urged to visit the web site established for this closure or contact Louisville District staff.

Peter W. Frick
Operations Manager
Locks and Dam Project Office

B Appendix:

Shipper and Carrier Survey Forms

U.S. Army Corps of Engineers
502 8th Street
Navigation Planning Center, RM 3418
Huntington, WV 25701

REPLY TO
ATTENTION OF

The Corps of Engineers is conducting a survey of companies that normally ship/receive commodity traffic through the McAlpine lock at Ohio River mile 607. Your facility has been identified as one such company. If your company functions as a public terminal or transfer facility and is not the final user of the commodity traffic in question, we would appreciate it if you would share this survey form with your customer(s).

As you may be aware, the lock chamber at McAlpine was closed for repairs between 9 and 20 August 2004. This closure halted river traffic through this river reach, due to the lack of an auxiliary chamber at the McAlpine facility. During the closure period, companies whose waterborne commodity shipments/receipts normally transited the McAlpine facility were faced with some important challenges. Company responses to the closure were varied. Some companies stockpiled product and were able to continue to operate despite the situation at McAlpine. Some companies redirected their commodity traffic to overland modes. Still other companies re-directed production to other plants. All of the measures taken resulted in additional costs to the companies involved.

This survey has been initiated in an attempt to identify the actions taken and the total costs to industry associated with the closure event at McAlpine. An accurate assessment of the total costs to industry will provide important information that will bear on future repair, rehabilitation or other construction-related decisions regarding the McAlpine facility.

The attached survey questionnaire contains some fairly detailed questions aimed at identifying the measures taken and tabulating the costs. We would greatly appreciate it if you would examine the questionnaire and answer the questions to the best of your ability. A partial response is preferable to no response. Please bear in mind that any information provided will be treated as confidential and that participation in the survey is voluntary. Participation in the survey demonstrates support for the continued, efficient operation of the navigation system.

Please return your completed survey form to this office by 30 March 2005. Should you have any questions regarding the survey, please do not hesitate to contact Sharon Weekley of my staff. She can be reached via phone at (304) 399-5334 or email at SharonW@lrh.usace.army.mil.

Sincerely,

David A. Weekly, Chief

Navigation Planning Center

MCALPINE CLOSURE SHIPPER SURVEY

Date: _____

Firm: _____

Address: _____

_____

Phone: _____ FAX: _____

Point of Contact: _____ E-Mail_____

Title: _____

General Description of Firm and Products Produced: _____

_____

NOTE: ALL RESPONSES WILL BE TREATED AS CONFIDENTIAL

1. Did your company have sufficient notice of the scheduled McAlpine closure to prepare a response plan? (a) Yes (b) No

Comments:
_____

_____

2. During the period of closure of the lock chamber at McAlpine, what was your company's response?
___a. No change in procedures.
___b. Stockpiled product and waited for McAlpine to re-open.
___c. Switched to all-overland mode for product delivery from existing sources.
___d. Switched to different waterway routing for product delivery from existing sources
___e. Switched product source to an entirely new source.
___f. Ceased operations during the period of closure.
___g. Altered production during the period of closure.

___h. Switched production to another facility.

___i. Purchased intermediate or final product, rather than produced.
___j. Other or combinations of the above. (Please explain.) _____

(2.j.
cont'd.)_____

_____
___

Other Comments:
_____

_____
___

3. Which of your commodities and tonnages were affected by this closure?

_____

_____

_____

4. If a reasonable estimate can be made, what additional costs (over and above normal operations) did you incur as a result of the closure event at McAlpine? If possible, please itemize according to the categories in question 2.

_____

_____

_____

5. Has the closure at McAlpine caused your company to alter its long-term transportation strategy (e.g. switch to all-overland modes, increase stockpiles, etc.)? How will this impact your total commodity transportation or other costs (per year). Please explain.

_____

_____

_____

6. Has the closure at McAlpine caused your company to take any other long-term permanent measures? (switch production to another facility, purchase intermediate or final product rather than produce, etc) Please explain. How will this affect your company's long-term operating costs (per year)?

_____

_____

_____

7. Has your company been impacted by other navigation system disruptions? Did they influence your response to the McAlpine closure?

_____

_____

_____

8. Other Comments.

_____

_____

_____

Note: The Corps of Engineers may not conduct and respondents need not respond to a survey questionnaire unless it displays a currently-valid OMB number. It is estimated that the information requested can be gathered in about 30 minutes.

U.S. Army Corps of Engineers
502 8th Street
Navigation Planning Center, RM 3418
Huntington, WV 25701

REPLY TO
ATTENTION OF

The Corps of Engineers is conducting a survey of the major carriers that normally use the McAlpine lock at Ohio River mile 607. Your company has been identified as one such company.

As you may be aware, the lock chamber at McAlpine was closed for repairs between 9 and 20 August 2004. This closure halted river traffic through this river reach, due to the lack of an auxiliary chamber at the McAlpine facility. During the closure period, companies whose waterborne commodity receipts normally transited the McAlpine facility were faced with some important challenges. Company responses to the closure were varied.

This survey has been initiated in an attempt to identify carrier reactions to the closure event. An accurate assessment of carrier reactions/procedures will provide important information that will bear on future repair, rehabilitation or other construction-related decisions regarding the McAlpine facility.

The attached survey questionnaire contains some fairly detailed questions aimed at gathering this information. We would greatly appreciate it if you would examine the questionnaire and answer the questions to the best of your ability. A partial response is preferable to no response. Please bear in mind that any information provided will be treated as confidential and that participation in the survey is voluntary. Participation in the survey demonstrates support for the continued, efficient operation of the navigation system.

Please return your completed survey form to this office by 1 April 2005. Should you have any questions regarding the survey, please do not hesitate to contact Sharon Weekley in the Navigation Planning Center. Mrs. Weekley can be reached via phone at (304)-399-5334 or email at SharonW@lrh.usace.army.mil.

Sincerely,

David A. Weekly, Chief
Navigation Planning Center

MCALPINE CLOSURE CARRIER SURVEY

Date: _____

Firm: _____

Address: _____

_____

Phone: _____ FAX: _____

Point of Contact: _____E-Mail_____

Title: _____

General Description of Firm/Commodities Handled: _____

_____

_____

NOTE: ALL RESPONSES WILL BE TREATED AS CONFIDENTIAL

1. Did your company have sufficient notice of the scheduled closure at McAlpine to prepare a response plan? (a) Yes (b) No

Comments: _____

_____

2. How did your company operate during the scheduled main chamber outage at McAlpine? Check as many items as are applicable and explain any unusual procedures.
___a. Barges were tied up at fleeting areas; towboats operated elsewhere in the system.
___b. Towboats remained in queue with barges.
___c. Towboats (light) held positions in queue.
___d. Company avoided the lock when possible.
___e. Other (Please explain). _____

_____

Comments: _____

_____

_____

3. If a reasonable estimate can be made, what additional costs (over and above normal operations) did you incur as a result of the closure event at McAlpine?

_____

_____

_____

4. Prior to the outage at McAlpine, towing industry representatives, in cooperation with the Corps of Engineers, developed some operating procedures that were put in place at the time of the closure. Do you believe this effort was (a) effective, (b) ineffective or (c) only partially effective? (Please explain)

_____

_____

_____

_____

5. Did the experience with the outage at McAlpine cause your company to adopt any new operating procedures to accommodate lock outages elsewhere in the system? (Please explain.)

_____

_____

_____

Note: The Corps of Engineers may not conduct and respondents need not respond to a survey questionnaire unless it displays a currently-valid OMB number. It is estimated that the information requested can be gathered in about 30 minutes.

C Appendix:

McAlpine Lock Closure Synopsis

August 2004 Main Chamber Maintenance Closure McAlpine Lock and Dam

Closure Began	16:57 hours 8 August 2004
Closure Ended	16:20 hours 19 August 2004
Delay Returned to Zero	11:40 hours 20 August 2004
Closure Duration	10 Days, 23.4 Hours
Time Required for Queue to Return to Zero	19.33 Hours
Closure Induced Delay	1448.3 Hours
Closure Induced Processing Time	0.0 Hours
Total Closure Induced Extra Time	1448.3 Hours
Maximum Delay	257.08 hours ~ 10.7 Days
Tow Cost @ McAlpine	$ 480.0 per Hour[4]
Total Closure Induced Cost	$695 Thousand

[4] FY03 price level, 0.05875 discount rate

Information Paper[5]

August 2004 Main Chamber Maintenance Closure McAlpine Lock and Dam

Chronology

The 1200' x 110' main chamber at McAlpine Lock and Dam, Ohio River Mile 606.8, was closed for maintenance on 8 August 2004 at 16:57 hours. It was reopened on 19 August 2004 at 16:20 hours. Therefore, the main chamber was closed for 263.4 hours, or approximately 10 days and 23 hours.

Tow Arrivals

Figure 1 shows the arrivals per day at McAlpine L&D for the month of July through August. Average tow arrivals per day for the period of 15 July – 7 August was 18.5 tows per day. Average arrivals per day for the closure period 8 August – 19 August were 1.5 tows per day.

Tow Processing Time

During the closure of the 1200' chamber, there were no tows lockages through McAlpine, thus, no induced processing time.

Tow Delays

Figure 1 shows delays at McAlpine L&D for August 2004. Delays started building soon after the 1200' chamber closed and continued until 20 August 2004 at 1140 hours. This means that the 263.4 hour closure impacted traffic for 282.7 hours. The 19.3 hour difference represents the time required for the reopened 1200' chamber to serve the 19 tows in queue and bring the delay back to zero. During the impact period, 1468.6 hours of tow delay were experienced by 19 tows. This works out to an average delay of 77.3 hours/tow. By comparison, 5071 tows were served at McAlpine outside the August 2004 closure. The average delay per tow was 63.5 minutes or 1.1 hours. Therefore, on average, each tow experienced 76.2 hours more delay during the closure than normal. Given that the average additional delay per tow was 76.2 hours, and that 19 tows were impacted, the closure caused 1448.4 hours of additional delay. The maximum delay was 257.1 hours, which is about 10.7 days. The maximum queue length was 3 tows.

[5] discrepancies due to rounding

Cost Impact

Time is money to the towing industry. The most recent information available indicates that the average tow transit costs at McAlpine are about $480 per hour. Given the analysis above which shows that the closure caused an additional 1448.4 hours of additional delay, and that transit costs at McAlpine are about $480 per hour, the August 2004 closure cost approximately $695 thousand.

For purposes of comparison, let's compare the delay caused by this closure with the delay experienced for all of 2003. The total delay experienced at McAlpine in 2003 was 4048.1 hours. The total delay caused by this 10+ day closure was 1468.6 hours. This means that the delay caused by the closure was 0.4 times as much as what was experienced for all of 2003.

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The NETS research program is developing a series of practical tools and techniques that can be used by Corps navigation planners across the country to develop consistent, accurate, useful and comparable information regarding the likely impact of proposed changes to navigation infrastructure or systems.

The centerpiece of these efforts will be a suite of simulation models. This suite will include:

- A model for forecasting international and domestic traffic flows and how they may be affected by project improvements.
- A regional traffic routing model that will identify the annual quantities of commodities coming from various origin points and the routes used to satisfy forecasted demand at each destination.
- A microscopic event model that will generate routes for individual shipments from commodity origin to destination in order to evaluate non-structural and reliability measures.

As these models and other tools are finalized they will be available on the NETS web site:

http://www.corpsnets.us/toolbox.cfm

The NETS bookshelf contains the NETS body of knowledge in the form of final reports, models, and policy guidance. Documents are posted as they become available and can be accessed here:

http://www.corpsnets.us/bookshelf.cfm

NETS

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