FAILURE TO HOLD WATER

Economics of the New Lock Project for the Industrial Canal, New Orleans

CAWIC

December 2007

PREFACE

This report was commissioned by Citizens Against Widening the Industrial Canal (CAWIC) with strong support from the Holy Cross Neighborhood Association and the Lower Ninth Ward Center for Sustainable Engagement and Development. Together these groups represent many who would be severely disadvantaged by the U.S. Army Corps of Engineers' proposed replacement of the existing Industrial Canal Lock. While past efforts have primarily focused on environmental and community impacts, these groups have long maintained that the underlying economic assumptions used in pursuit of the lock project were contrived and unrealistic.

CAWIC is a grass-roots group founded in the mid-1990's to defend the community and environment from the adverse impacts of this project. In 1999 CAWIC received a McKnight grant for independent sampling of Industrial Canal sediments likely to be disturbed by the project, which led to a 2004 McKnight grant to hire expert toxicological testimony. With the help of the Tulane Environmental Law Clinic, this earlier work resulted in a federal judge's order to halt the lock project in 2006, pending a new Environmental Impact Statement.

We are at a critical juncture. With dramatic changes in waterway usage from the Mississippi River-Gulf Outlet failure, and a mandate to restore coastal wetlands, it is time to revisit the economics justifying this expensive and disruptive project. Just as we require lock structures to hold water, we demand that Corps studies meet objective standards verifiable over time. Here is our own report that overlays Corps projections with new data on waterway traffic to show why this project fails the test.

The author of "Failure to Hold Water," Dr Robert Stearns, is an independent consultant with extensive background in transportation economics. He has, notably, served as Deputy Assistant Secretary of the Army (Civil Works). His twenty years of federal employment also included service with the Department of Transportation and the U.S. Army Corps of Engineers. Dr. Stearns taught economics for ten years--at Connecticut College, Ohio State University, and, most recently, at the University of Maryland's School of Public Policy. He holds a B.A. in mathematics from Swarthmore College, and an M.A and PhD in economics from Yale University.

This report has been underwritten by grants from the Corps Reform Network and the Rockefeller Gulf Coast Fund for Community Renewal and Ecological Health. The Gulf Restoration Network has served as fiscal agent and facilitated the presentation to the public. Assistance was also provided by the Louisiana Environmental Action Network and the Environmental Support Center. We are grateful for the support of these groups and to the people and organizations of Holy Cross and the Lower Ninth Ward for their steadfastness in working for accountability, hurricane protection, environmental justice and sustainable community by questioning and opposing the lock project. We are grateful for everyone who has stood with us these long years in the shadow of this project.

CAWIC wishes to acknowledge its long-time volunteers and board Shelby Wilson, Mary Patsy Story, Dean Reynolds, Collins Phillips, Peter McHugh, Rev. Leroy Edwards and Pam Dashiell. Our thanks too to Ed Doody whose articles in the St. Bernard Voice have kept us all going, and to Monique Hardin for her strength and wise counsel.

Thank you all.

John Koeferl,
President
CAWIC

EXECUTIVE SUMMARY

In 1997, The U.S. Army Corps of Engineers published the results of its economic evaluation of a proposed lock to replace the existing lock in the Industrial Canal (also called the Inner Harbor Navigation Canal). It concluded that a new shallow draft barge lock yielded the highest national economic benefits, but recommended a more expensive larger lock to accommodate deep draft traffic be built instead. This recommendation was based on the willingness of the local sponsor (the Port of New Orleans) to finance the incremental costs of building the larger structure.

Since then, there have been numerous developments that were not foreseen by the Corps in its 1997 report. These include:

- Significant reductions in the levels of commercial traffic transiting the lock;
- Average delay times at the lock that are well below the amounts forecast;
- Changes to the cost sharing arrangement, shifting much of the incremental costs from the Port to the federal government;
- The impact of Hurricane Katrina, not only for the City of New Orleans, but for the water transportation industry
- The probable closure of the Mississippi River Gulf Outlet (MRGO) deep draft channel.

Even as circumstances began to change, the Corps proceeded with the preliminary stages of construction. Finally, in 2006, a United States District Court concluded that the Corps had not met all of the requirements of the National Environmental Policy Act and ordered that construction be suspended until these issues could be adequately resolved.

The unanticipated changes described here could have a major impact on the Corps' findings. It is appropriate therefore, that before construction is resumed, the questions that have recently emerged be fully addressed. In order to understand the magnitude of the impacts, we have conducted an independent evaluation by applying the economic data over the last decade to the methods developed by the Corps in its 1997 report. Our major conclusions are:

- The decline in traffic and the limited delays that have been observed are so significant that even the best project (the shallow draft lock) can not be justified.
- Since the best project fails the basic economic test, all others, including the recommended deep draft lock also fail.
- The probable closure of MRGO makes the economic case for a deep draft lock even weaker.
- These conclusions are valid even when the benefits are compared to the remaining costs of the project. Resuming construction of the lock would be throwing good money after bad.

Our major recommendations are:

- The Corps should accept the conclusions demonstrated in our report and recommend that the Industrial Canal Lock Replacement Project be deauthorized.

- If the Corps decides to proceed further despite these findings, the Corps should conduct a new economic reanalysis that uses the data available since its earlier report. Such a reanalysis must be subject to rigorous independent review that permits input from and feedback to all of the project stakeholders.

These findings and recommendations are based on the economic analysis alone. When considered in concert with unresolved environmental and community concerns, the case against this project is overwhelming.

Our report is divided into four major sections. Our Introduction provides more detailed background material and expands on our major findings. In the second section, we look at the data and apply the Corps' 1997 methodology to determine the economic viability of the shallow draft lock yielding the highest economic return. This section includes a presentation of the findings mathematically and graphically; discusses the nature and causes of the delays that currently occur; and provides anticipated criticisms of our findings and evaluates the merits of these potential arguments.

The third major section is an evaluation of the deep draft alternative that the Corps recommended. First we discuss (and reject) the possibility that this alternative continues to have merit even though the project yielding the highest economic return does not pay for itself. Second, we evaluate the probable consequences of the likely closure of MRGO. The final section provides a summary and expands on the recommendations made in this executive summary.

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INTRODUCTION

For more than a decade, the U.S. Army Corps of Engineers has argued that the existing Industrial Canal Lock (also called the Inner Harbor Navigation Canal Lock), connecting the Mississippi River to the Mississippi River Gulf Outlet Channel and the eastern portion of the Gulf Intracoastal Waterway, should be replaced. Despite hundreds of pages of analysis and numerous public hearings, there are many remaining controversial issues. Construction has been delayed as a direct consequence of the weaknesses of the Corps' arguments. Serious environmental and community impacts have not been resolved. Project supporters contend that the economic advantages outweigh these negative consequences. But with the passage of time, any possible economic justification has been lost by the changing socio-economic circumstances in the study region and by the additional water transportation data now available that are in stark contrast to the rosy forecasts used to justify the project.

The current conditions at the lock and the design for the new lock can both be seen at: http://www.mvn.usace.army.mil/prj/ihnc/EvaluationReport/ihnc_eval.htm. Figures One and Two below are reproduced from that web site.

Figure One.

INDUSTRIAL CANAL, NEW LOCK PROJECT
Construction Sequence

Existing conditions.

Figure Two.

INDUSTRIAL CANAL, NEW LOCK PROJECT
Construction Sequence

Completion of the project including the relocated lock and replacement of the existing St. Claude Avenue bridge.

The first slide (Figure One), representing the beginning of the proposed construction sequence, shows the existing conditions at the lock. The picture shows barges in the lock between the St. Claude Ave. Bridge (foreground) and the Claiborne Ave vertical lift bridge. The lock is used to raise or lower vessels to compensate for the differences between the height of the Mississippi River south of the Canal and the (lower) height of the Mississippi River Gulf Outlet Channel north of the Canal.

Visitors to the website can then click their way through the 16 phases of the construction sequence with the final picture being the completed project. The new lock is shown north of the Claiborne Ave, bridge. The Corps expects that the new lock and modifications to existing bridges will reduce delays for both vessels in the canal and for motor vehicles crossing the canal over the canal's three bridges.

Of course, in the real world, getting from Figure One to Figure Two involves more than a few clicks of a mouse. There are economic costs of construction as well as environmental and community impacts. Suppose for example, that the new lock would cost $200 billion to construct. We would expect virtually all tax payers to conclude that this would be too much to pay for improvements that will save each tow in the river a few hours as they wait their turn to lock through.

Certainly a new lock would cost less than $200 billion, but the lesson of this example should not be lost. If the new lock is free, there would be at least an economic basis for construction. If the lock costs too much, the new lock should not be built. Where is the dividing line between the "go" and "no go" decision? That is where the economic analysis comes in and where the environmental consequences and community impacts must also be fully considered.

The Water Resources Development Acts, the National Environmental Policy Act and other applicable laws require that the United State Army Corps of Engineers comprehensively study the economic, social and environmental costs and impacts of a project. As a result, such studies are routinely made a part of the Corps' planning process. The studies for the proposed new Industrial Canal Lock were included in a March1997 report, "Mississippi River- Gulf Outlet, New Lock and Connecting Channels, Evaluation Report."[1] The economic analysis included in that Report was completed using data through 1994.

The Holy Cross Neighborhood Association and several environmental groups challenged the environmental analysis as inadequate and have been able to convince a federal court to require the Corps to revisit its Environmental Impact Statement to fully address the flaws in its analysis. In addition, the Holy Cross Neighborhood Association, as well as taxpayer groups, have criticized the Corps economic analysis pointing our the fact that traffic on the Canal today does not come close to the amounts predicted for the canal in the Corps 1997 Report.

Proponents do not concede that the loss of traffic eliminates the justification for the new lock. Some offer the counter argument that the failure to replace the lock is the primary reason for the loss of traffic. One such proponent, Ken Wells of the American Waterways Operators wrote in April 2003 that:

> "With each passing year, the costs of the [existing] lock and the negative consequences on tonnage will be felt more strongly. The question is not whether declining tonnage affects the viability of the project, but rather whether the new lock can be built quickly enough to reverse the economic and environmental damage resulting from its own obsolescence."[2]

[1] Hereinafter referred to as "the Corps' 1997 Report." Available at http://www.mvn.usace.army.mil/prj/ihnc/EvaluationReport/ihnc_eval.htm

[2] Ken Wells, 'The Inner Harbor Lock, The High Cost of Delay," April 2003, p 10. Available at http://www.gicaonline.com/media/tools/INHCanalysis.pdf

As we discuss below, there are compelling reasons to reject the conclusions he reaches. But even if his analysis were not flawed, his paper lacks one crucial detail. It does not include any discussion of the costs to build the new lock. As a result, there is no analytical basis for the conclusions that it reaches.

Other project supporters focus on the simple claim that the existing lock is so old that it is "obsolete." Of course, the term "obsolescence" is subject to professional interpretation. In the case of the Industrial Canal Lock, while repairs are necessary from time to time, this "obsolete" structure still manages to process roughly 11,800 lockages a year, or over 32 lockages a day.[3] Still, even when the "obsolescence" argument is based simply on the age of the lock, if there is no consideration of the costs of replacement, there is no basis for this claim.

In this paper, we offer a new look at the old economics. We have not developed any new models to simulate river and vehicular movements, nor have we rerun any of the Corps' models. Instead we have taken data from the Corps' 1997 report and updated it by applying statistics of actual barge movements, tonnage and delays through 2005. Our major conclusions are:

- The Corps' 1997 report concluded that a "shallow draft" lock 900 feet long, 110 feet wide and 22 feet deep would generate the greatest economic return to the taxpayer. Subsequent events have shown conclusively that even this alternative will cost far more than it returns.

- Since the Port of New Orleans indicated a willingness to pay any additional costs, the Corps recommended that a "deep draft" lock 1,200 feet long, 110 feet wide and 36 feet deep, should be built instead. Based on the 1997 analysis, the recommended lock yields fewer net benefits than the shallow draft lock that itself, can no longer be justified. There is clearly no analytical basis to support construction of either alternative. This conclusion is reinforced by the virtual certainty that the Mississippi River Gulf Outlet (MRGO) Channel will be deauthorized in the near future.

- The Corps' 1997 report could not have anticipated all of the significant changes to New Orleans and the Industrial Canal that have occurred in the last 10 years. Some may argue that the new circumstances may change our conclusion that based on the 1997 Report; there is no longer any economic justification for a new lock. However, the Corps has not undertaken any studies that would support such an assertion. A major economic reanalysis should be a minimum requirement before proceeding with construction. This reanalysis should allow ample opportunities for independent peer review and meaningful stakeholder input.

[3] The three year average number of lockages for 2002-2004 was 11,778, the daily average was 32.3. Data for 2005 was not included because of the effects of Hurricane Katrina. Data for 2006 is not yet available. Source: Corps of Engineers, Lock Performance Monitoring System, available at http://www.iwr.usace.army.mil/ndc/lpms/lpms.htm

ANALYSIS OF THE NATIONAL ECONOMIC DEVELOPMENT ("NED") PROJECT ALTERNATIVE

***Is this project still economically justified*?**

The Corps' methodology for evaluating and recommending projects is a two step process. In step one, the costs and benefits of various project alternatives are projected (in comparison to the "without project" condition) and the alternative that generates the highest net national economic benefits (benefits minus costs) is identified. In many cases, this alternative, formally designated as the "national economic development" or NED alternative, becomes the recommended project.

Step two involves negotiations with local sponsors to see if there are any "locally preferred plans." If a local sponsor is willing to pay the difference in construction costs between the NED plan and an alternative, the Corps will recommend that the alternative be constructed. The Industrial Lock replacement project is a good example of this. The NED plan involved constructing a shallow draft lock 900 ft long by 110 ft wide by 22 ft deep. The Port of New Orleans indicated a willingness to pay the additional costs of a deep draft lock 1,200 ft long by 110 ft wide by 36 ft deep.[4] This became the recommended plan.

In this paper, we will, as a first step, compare the Corps' expectations for the NED project as described in the report to the reality of current economic conditions in the project area. A subsequent section will address the choice of the locally preferred plan. The test of the remaining economic viability of any project alternative rests first with the NED project. If this alternative cannot be justified, no other alternative will pass the fundamental economic test.

The analytical basis for the Corps' decision rests on its estimate of how much it would cost to build, operate and maintain the new lock and on a forecast of future economic activity that could potentially benefit from an improved infrastructure. The traditional comparison is between "annual benefits" and "annual costs" In its 1997 report, the Corps forecast total annual benefits for the NED lock to be $104.3 million; total annual costs to be $51.0 million; for a benefit cost ratio of 2.05.[5]

"Annual costs" are the equivalent of what an agency would pay each year for 50 years if it borrowed the money to construct and maintain the lock at the time the lock was completed (for this study, the interest rate of the "loan" was 7.375 percent[6]). The

[4] The Corps' 1997 Report's "Conclusion," p. 3.
[5] Corps' 1997 Report, Appendix E, p E-270.
[6] More formally, this is the discount rate used by the Corps to compare benefits and costs that occur at various points in time over the life of the project.

construction expenditures for the NED lock were estimated to be $392.5 million while annual operation and maintenance was estimated to be $1.4 million.[7] These amounts were based on price levels in 1996. It would cost more to build starting in 2007, but since the Corps did not recommend the NED project, there is no publicly available estimate of what it might cost at 2007 price levels.

The objective of our study is to update the comparison of annual costs with annual benefits. Since costs are only available at 1996 price levels, we will use 1996 price levels to measure the benefits for most of the analysis of this section.

There are five categories of benefits that the Corps expected the replacement locks considered in their study to provide. One category involves deep draft traffic and therefore does not apply to any of the "shallow draft" lock alternatives. All five categories are listed here in order of importance for the NED project. The parenthetical percentages represent each benefit category's share to the total:

- Reductions in delay for shallow draft vessels (tows) (80.5%). A larger lock will speed up the process of lockage, allow more vessels to be locked through at one time and reduce the hours of delay waiting to be locked through.

- Elimination of delays that would be required to repair the existing structure (10.0%). Major repairs to the existing lock would require prolonged closing which would add to the routine tow delays in the first benefit category. Since publication of the report, most, if not all of these repairs have been made. Closure of the lock for these repairs created additional delays as the Corps forecast, but they are now "sunk costs" and can no longer be considered as a source of potential benefits for the replacement project.

- Reductions in delay for vehicular traffic caused by bridge openings needed to allow vessels to transit the canal and lock (5.7%). The recommended plan included modifications to existing bridges that would reduce but not eliminate the need for bridge openings. As shown in Figure Two above, the replacement bridge at St. Claude Avenue would still need to be opened to accommodate at least some of the barge traffic.

- Saving in extraordinary repairs and operation and maintenance to the existing lock (3.8%). Again, most, if not all of these repairs have been made since the 1997 report. They no longer represent potential benefits.

[7] The costs of each project alternative are discussed in the Corps' 1997 report, Appendix E, pp E-258- E-262. Construction was planned over a 12 year period and "total project costs" used to calculate annual costs included "interest during construction." In other words the present value of construction costs when the project was complete was greater than the simple sum of construction expenditures over the 12 year period. "Total project costs" also included mitigation costs, designed to compensate for local environmental and community impacts.

- Cost savings to deep draft traffic (0.0%). Since the NED lock is only 22 feet deep, it would not accommodate deep draft vessels.

It is clear that the primary remaining justification for the NED lock rests with the routine reductions in tow delays that the new lock could achieve. Each hour of delay costs a tow operator money which must be absorbed by the operator or passed on to the shipper. In either case it represents an economic waste of resources. The Corps has barge and tow cost models that it used to estimate the average hourly tow costs and queuing models that it used to establish a theoretical relationship between the level of traffic on a channel and the average delays this traffic incurs as it waits its turn to use the lock. Since we do not have access to the cost models, it has not been possible to update the Crops' hourly costs. However, new data, available yearly, on traffic levels and average hours of delay are included on-line at the Corps' Navigation Data Center. It is possible therefore, to apply this new data to the Corps' 1996 barge and tow cost estimates and see to what extent the benefits predicted in the Corps' 1997 report might have occurred if the new lock was available for use.

The cost data included in the Corps' 1997 report are displayed as "Hourly Costs of Delay for Commodities at System Locks (Dollars per 1,000 Tons)."[8] The range, as shown in the following table, is from a low of $49 for non-metallic minerals to a high of $82 for industrial chemicals.

Table One:

Commodity	Hourly Cost of Delay at Industrial Canal Lock (Dollars per 1,000 Tons
Farm Products	56
Metallic Ores	55
Coal	55
Crude Petroleum	51
Non-Metallic Minerals	49
Forest Products	55
Industrial Chemicals	82
Agricultural Chemicals	75
Petroleum Products	51
All Others	64

Source: Corps 1997 Report, Volume 7 (Appendix E), p. E-103 (Table 3-4).

We have used an average of $60 for the analysis below.[9]

Given the observed levels of traffic, what does this mean for an average tow transiting the lock? We have used data from 2004 as our example. This is the last year before Hurricane Katrina and may therefore be a representative year for waterborne

[8] Corps 1997 Report, Appendix E, p E-103. The table does not include a year of reference, but from the accompanying text, it appears to be 1992 prices. Later in Appendix E (p E-264), the Corps asserts that there is very little difference in the 1992 and 1996 price levels.

[9] Information on delay by type of tonnage is not publicly available. Since 2000, the highest share of Industrial Lock traffic has been petroleum and petroleum products. The relatively low hourly cost of delay for these commodities would offset the higher costs of delay for chemicals.

commerce in the New Orleans area in the mid-decade of 2000-2010. In 2004, 8,509 commercial tows were locked through the Industrial Canal Lock.[10] On average there were 1.3 loaded barges per tow and 0.9 empty barges. There were 1,680 tons per loaded barge, or on average 2,193 tons per tow. Each tow was delayed on average 11.35 hours. According to the Corps' model the total cost of delay for a single tow would be:

(Tons per tow X [hourly cost per thousand tons / 1,000]) X average hours delayed =

2,193 * (60/1000) * 11.35 = $131.58 * 11.35 = $1,493.

The model shows that in 2004, it cost each tow $131.58 per hour for a total of $1,498 in operating expenses (on average) as it waited its turn to go through the lock.

The total cost of delay:

Number of tows during the year X the cost per tow =

8,509 * $1,493 = $12.704 million

While this may seem like a high cost to pay for delay, it must be compared to the average annual cost of construction and O&M of the new lock (pointed out above) of $51.0 million. If all of these delays could be avoided and they were the only benefits being derived from the project, the federal government and local sponsor would be spending $4.00 for every $1.00 of benefits generated. This is equivalent to a benefit cost ratio of only 0.25, far below the threshold value of 1.00 needed to justify even a marginal product.

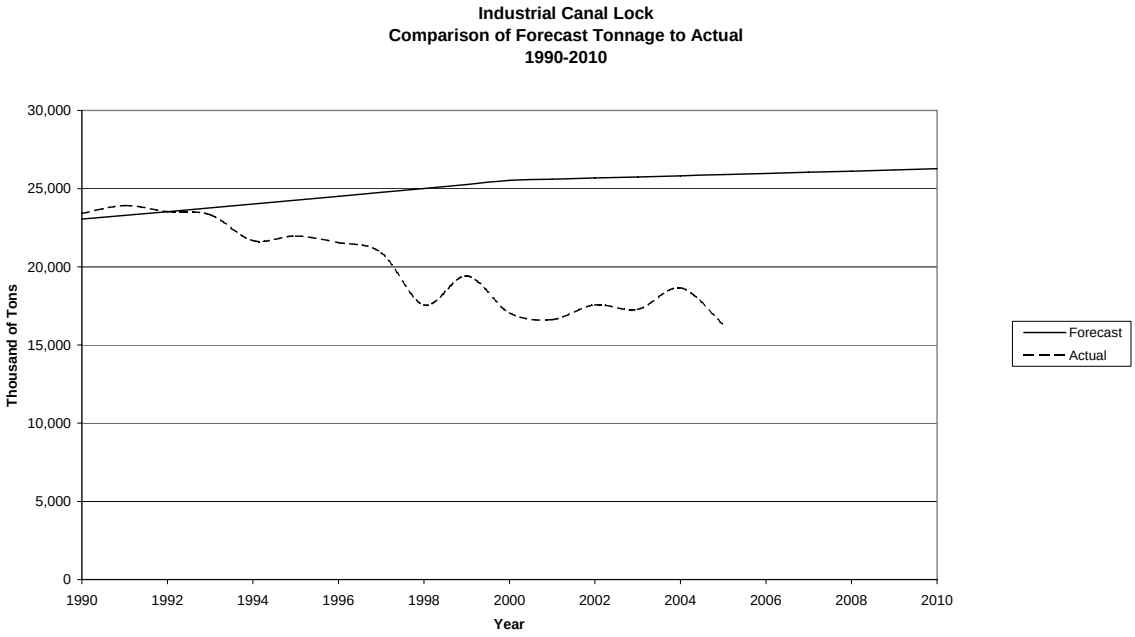
The difference in the conclusions reached in the Corps' 1997 report and this analysis are a direct result of the differences between the Corps' forecasts and actual data, not only for barge traffic using the lock, but in the average hourly delay experienced by each tow. The 2004 forecast traffic was 25.827 million tons for the "without project condition;"[11] the actual level of traffic was 18.663 (72 percent). The 2004 forecast average hourly delay was 30.6 hours;[12] the actual was 11.35 (37 percent). These differences are displayed graphically in Figures Three and Four below, first for tonnage and second for average hourly delay.

[10] All of the lockage information given in the paragraph is available from the Corps of Engineers Navigation Data Center's Lock Performance Monitoring System. http://www.iwr.usace.army.mil/NDC/lpms/lpms.htm

[11] This value is an interpolation of the forecasts given by the Corps in the table on p E-175 in Appendix E of its 1997 Report. The table contains forecast for each year ending with a zero digit (2000, 2010, etc.). We assumed that tonnage would grow at the same percentage rate in all of the intervening years.

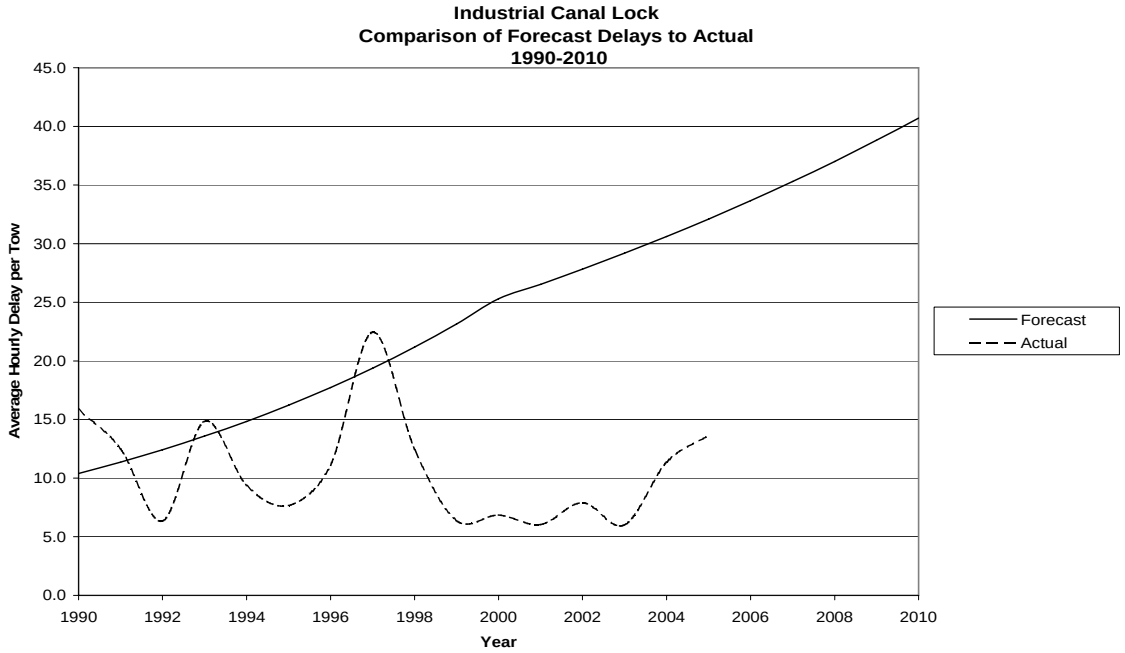
[12] This value is an interpolation of the forecasts given by the Corps in the table on p E-167 in Appendix E of its 1997 Report. The table contains forecast for each year ending with a zero digit (2000, 2010, etc.). We assumed that average hourly waits would grow at the same percentage rate in all of the intervening years.

Figure Three.



Source: Forecast; for 1990, 2000, 2010, Corps 1997 Report, Volume 7 p. E-175 (values interpolated for other years). Actual; Corps of Engineers, Lock Performance Monitoring System, available at http://www.iwr.usace.army.mil/ndc/lpms/lpms.htm

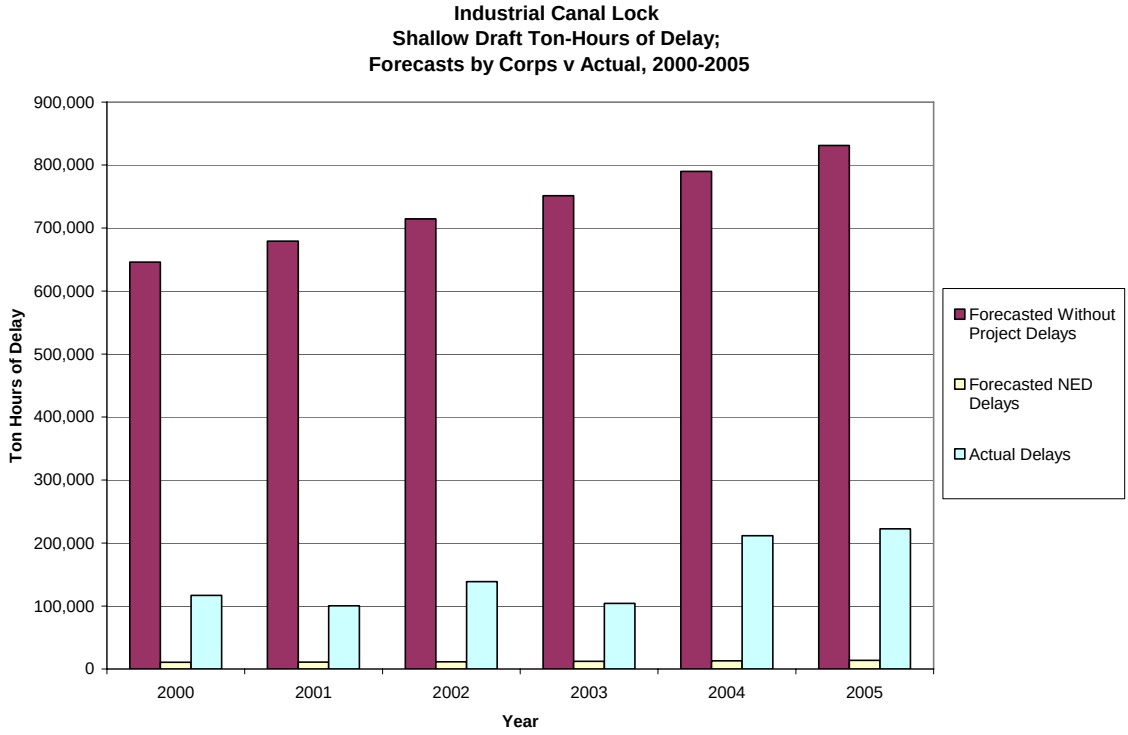
Figure Four.



Source: Forecast; for 1990, 2000, 2010, Corps 1997 Report, Volume 7 p. E-173 (values interpolated for other years). Actual; Corps of Engineers, Lock Performance Monitoring System, available at http://www.iwr.usace.army.mil/ndc/lpms/lpms.htm

By combining the tonnage and delay data (forecast and actual) into a single statistic, the lack of economic justification becomes even clearer. This data is presented in Figure Five for 2000- 2005. The height differences between bars one and two of each group shows how much of a reduction in delays that the Corps predicted would result from constructing a new lock- the main source of project benefits. The height differences between bars two and three show the predicted delays at a new lock and what has actually occurred. As the figure clearly shows, these differences, representing the potential benefits hat might actually have been achieved, are a small fraction of the amounts used to justify the project.

Figure Five.



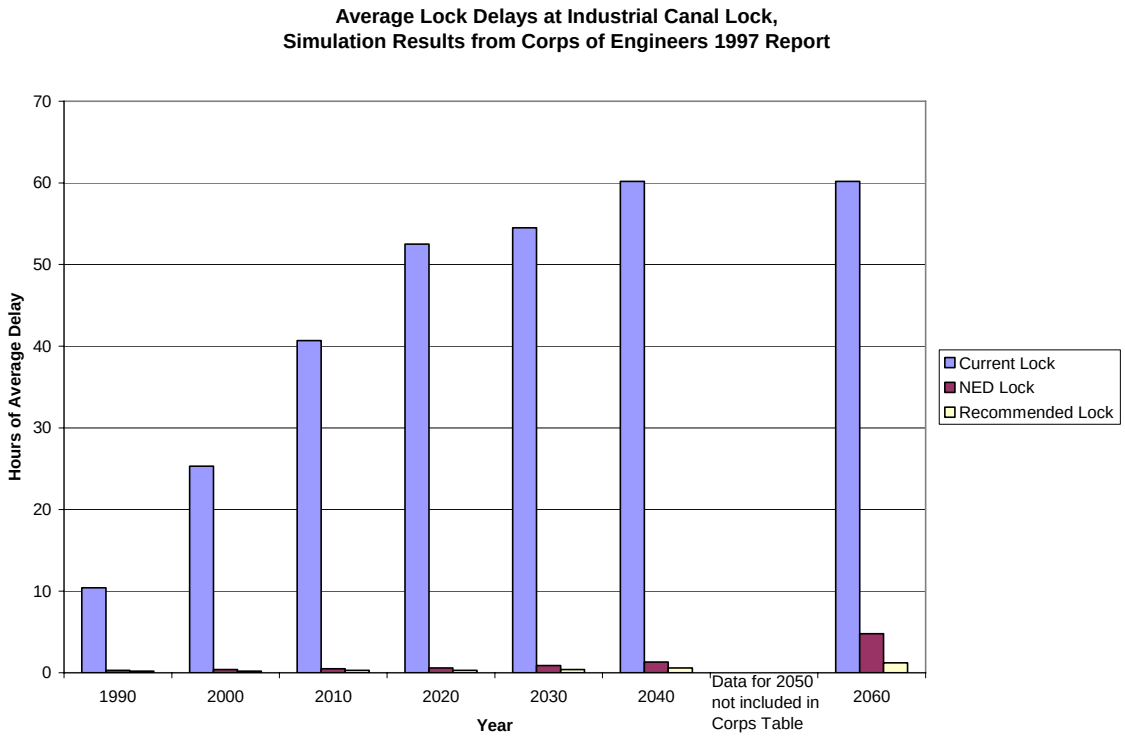
Source: Forecasts; for 2000, Corps 1997 Report, Volume 7 pp E173 and E-175 (forecast values interpolated for other years based on 2000 and 2010 forecasts, pp E173 and E-175). Actual; Corps of Engineers, Lock Performance Monitoring System, available at http://www.iwr.usace.army.mil/ndc/lpms/lpms.htm. Forecasts and actual estimated as total tons through lock times average delay per tow.

Can the new lock eliminate all delays?

Our analysis so far has assumed that all of the delays currently being experienced by the barge industry would be eliminated if the replacement lock were built. This assumption closely approximates the Corps' 2000- 2005 forecasts of delays with and without the project as shown in Figure Five above and extends throughout the entire

project life (through 2060, see Figure Six below).[13] Using this assumption maximizes the potential shallow draft transportation savings that might be realized if the new lock were built. We have demonstrated that even in these extreme circumstances, the cost of building the lock far exceeds the savings that might accrue to the barge industry and its customers. If a new lock cannot eliminate all delays, the case against replacement becomes even stronger.

Figure Six



Source: Corps 1997 Report, Volume 7 p E173.

"Delay" is defined by the Corps as the time between the arrival of a tow at the lock and the time lockage commences.[14] The data provided by the Corps through its Navigation Data Center (NDC) shows average delays per tow at the Industrial Canal Lock in 2004 to have been 11.4 hours. The Corps' web site that describes and promotes the Industrial Canal Lock Replacement Project does not reference individual years, but presents a similar conclusion; "Growth in waterway traffic over the years has made the

[13] While Figures Five and Six are intended to show two perspectives on the same concept, the units on the vertical axis are different (tow hours of delay and average hours of delay per tow). Note that the bar heights for the forecast NED lock delays in Figure Five and for the forecast NED and recommended deep draft lock delays in Figure Six show that some minimal delays are expected to continue.

[14] The Corps' Navigation Data Center Web Site http://www.iwr.usace.army.mil/ndc/lpms/lpms.htm has linkages to definitions of lock statistics and to the form used by the lock personnel to record data on individual tows. The definitions include the following for number of delayed tows: "The total number of tows which experience a delay (i.e. wait time greater than zero minutes) between the arrival point and start of lockage." The individual tow data form includes an entry for arrival time and start of lockage time.

Industrial Canal Lock one of the nation's most congested locks with an average wait of 10 hours, but often as much as 24-36 hours." [15]

There is one obvious mathematical inference that follows from the Corps' description of the data. If there are "many occasions" when the delay is between 24 and 36 hours, much of the traffic must be experiencing delays of only a few hours. This is the only way the average can be as low as 10 hours when there are many observations of 24 to 36 hours. For example, one tow experiencing 36 hours delay could be offset by two with zero delay (the average delay for these three tows would be 12 hours). Alternatively, if the minimum delay is two hours (the Corps claims that virtually every tow is delayed by some amount), there must be three tows at two hour delays to offset one tow at a 36 hour delay (the average delay for these four tows would be 10.5 hours).

In many statistical studies, the empirical data often resembles a "bell-shaped curve" (normal distribution). When this occurs, the extreme values far from the mean occur only infrequently. Based on the Corps' description of the data, this is not the case for the tow delay statistics at the Industrial Canal Lock.

What interpretation can be given to this probable bifurcated distribution of tow delays? It likely reflects the experience of tows from times when the lock is operating normally and times when the lock is unavailable for use. The Corps' 1997 Report identifies five categories of events leading to lock down time.[16] They are 1) weather conditions, fog, rain, etc.; 2) surface conditions, river current, flood, etc.; 3) tow conditions, interference from other tows, tow breakdowns, etc.; 4) lock conditions, conditions, hardware malfunction, maintaining lock, etc.; and 5) other conditions, vehicular bridge delays other than regular curfews, tow detained by Coast Guard, etc. These events can be due to "stalls," an interruption while a tow or other vessel is being processed, to unanticipated "unavailabilities," or to scheduled "unavailabilities" (for lock maintenance, etc.).

During normal times, tows approach the lock and get in line as necessary. With the lock constantly in use, the lines (queues) are not likely to be long and the delays should be minimal. When down times occur, especially unplanned events, tows already in transit will arrive at the lock and must wait at least through the time the lock is not operating and perhaps longer as the queue lengthens with the arrival of each new tow. The right combination of normal periods and down times could yield delay data consistent with a 10-11 hour average delay and "frequent" delays of 24 to 36 hours.

As part of the research for this paper, we have maintained a record of Industrial Lock operations from August 24 to November 5, 2007 as reported by the Corps in its Lock Status Reports.[17] The data includes maximum queuing times (not average) and the number of all vessels waiting to be locked through (not just tows). The results are

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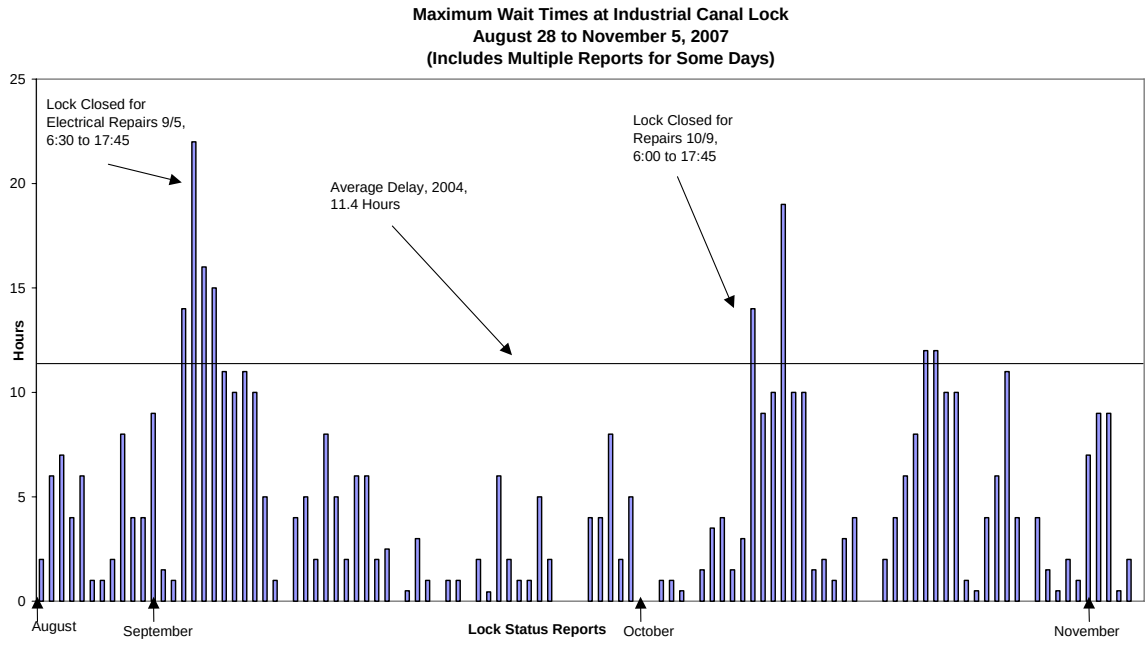
[15] U.S. Army Corps of Engineers, New Orleans District, Inner Harbor Navigation Canal Lock Replacement Project web site, http://www.mvn.usace.army.mil/pd/projectsList/home.asp. While the delays are attributed to growth in traffic, the Corps fails to acknowledge that traffic has been declining since 1991.
[16] Corps 1997 Report, p. E-140.
[17] Available at http://www.mvn.usace.army.mil/OD/LockUpdates/lockstatus.asp?lockid=3

consistent with the description above. As Figure Seven below shows, the queuing times spiked when the lock was closed on September 5 for electrical repairs and on October 9 for additional unspecified repairs. The maximum (not average) queuing times exceeded the 2004 average primarily during the repair periods (there are two exceptions). The maximum never exceeded 22 hours. If the rest of 2007 showed the same results, the average tow delay in 2007 should be less than the 2004 amount.

Figure Seven.



Source: Inner Harbor Navigation Canal Lock Status Report at http://www.mvn.usace.army.mil/OD/LockUpdates/lockstatus.asp?lockid=3

How would a new lock reduce delays? The chief advantage of the new lock would be its size. Since it is larger, it would be able to accommodate more than one tow or multiple non-tow vessels during a single lockage more often than the current lock can. As a basic concept, if two tows arrive at the same time and only one can be locked through, the second will be delayed. If the lock was larger and both could be locked through, there would be no delays. During normal periods of operation, tows arriving when there is a queue would see the queue reduced sooner if the lock were larger.

The new lock might reduce the number of down times that were lock related (required maintenance or repair of the lock itself) which in turn would increase the periods of normal operations. Other events caused by weather, river surface conditions, tow breakdowns, etc. would still occur. Even in these cases, however, a larger lock would help clear out the queues faster once the lock is reopened since more tows and other vessels could be processed, on average, in a single lockage.

Would the new lock eliminate almost all delays as the Corps' 1997 report suggests? The statistical distribution of delays would probably show that most of the

total delay hours occurred during periods of unavailability. The new lock would probably not eliminate all such events. The non-lock related events would still occur and the new lock would not be "maintenance free;" there may still be some necessary maintenance closures. Even though a larger lock may be able to clear out queues faster, there would still be delays during the closure periods themselves and once the lock is reopened, the reduction in queues would not be instantaneous. In addition, the project includes a planned replacement double Bascule Bridge at St. Claude Avenue; curfews limiting barge traffic would remain during commuting rush hours.

Under these circumstances, the virtual elimination of all tow delays would be impossible. As stated above, this increases the likelihood that the NED lock is not economically justified. The case for construction becomes even weaker.

This finding is, of course, dependent on the correct interpretation of the Corps' data regarding tow delays. If the Corps chooses to make a reevaluation of this project's economic viability, it should include an analysis of the empirical distribution of hourly delays and make this data available for public review. It should provide a more precise definition of "arrival times" as it applies to the Industrial Canal Lock. At what point are tows formally recognized as being in the queue? Are they physically visible from the lock or can they be tied up somewhere else? Answers to these questions will be factors in determining the cost of waiting.

The Corps should also seriously consider dropping its use of the simulation models used in its 1997 report to predict delays at future points in time (with increased traffic levels). If, as is likely, traffic will never exceed levels that have been historically observed (tonnage levels in 2004 were 22 percent lower than the amount using the lock in 1991), the Corps could place a greater reliance on the historical data. This would also allow the Corps to show the relative importance of temporary lock closures as a determining factor in the total delays for each year.

Summary of the NED lock analysis

There is only one possible conclusion that can be drawn from this analysis. When the Corps' analytical models are applied to the actual data on waterway traffic, delays and vehicular traffic over the canal, the so-called NED project and therefore all project alternatives fail the basic economic test. Any assertion that this project remains economically justified could only be based on a comprehensive reanalysis that, to date has not been made. This conclusion is derived from a recalculation of project benefits. Given the Corps' difficulty in meeting NEPA requirements, there is a strong possibility that total project costs were understated further weakening the Corps' case.

Because of the importance of this finding, we have considered possible counter arguments that might be advanced to support proceeding to construction. They are discussed as a series of hypotheses in the section that follows. None of these arguments are convincing; the case against construction remains incontrovertible.

Anticipated Responses to Our Critics

There are several possible arguments that might be advanced to challenge the conclusions of this paper:

- Our quantitative analysis was based on data from a single year (2004), a non-representative year.
- The new lock would not be completed until 2010; project benefits should be calibrated on traffic flows then, not for 2004.
- The Corps' estimates of barge and tow waiting costs are too low.
- Other benefit categories (such as reductions in vehicular traffic delays) are sufficient to keep the project viable.
- The analysis does not account for traffic that has left the river because of the current level of delays. Without delays, this traffic would return; benefits should be associated with the delay-diverted traffic.
- Over $100 million has already been spent on this project. Since benefits are realized only when the project is complete, the benefits should be compared only to the remaining costs.

Each argument is discussed below.

Hypothesis I. Our analysis was based on data from a single year (2004), a non-representative year.

Would the conclusions change if the analysis was based on a different year or on a composite of several years? Actually average tow delays in 1999-2003 ranged between 6.02 and 7.9 hours. Even though there was (slightly) more tonnage in comparison to 2004, the significantly lower delays would have made this project look even worse. The 2005 data shows higher average hourly delays but this was probably skewed by Hurricane Katrina and its aftermath. Delay figures for 2006 are not yet available. Tonnage in 2006 was only 74 percent of the total for 2004. Figure Seven above suggests that delays in 2007 may not reach the levels experienced in 2004

As a mathematical check, we conducted the same analysis using the data for each of the years 1999-2005. The results are compiled in Table Two below:

Table Two.

If the analysis were based on the following year:	Then the total (one year) cost of delay would have been: ($million)
1999	7.483
2000	6.926
2001	6.044
2002	8.225
2003	6.257
2004	12.748
2005	13.328

Source: Tons per tow, average hours of delay and total tows using lock obtained from Lock Performance Monitoring System, available at http://www.iwr.usace.army.mil/ndc/lpms/lpms.htm

Since 2005 was certainly not a typical year, the use of 2004 data may actually overstate the delay reduction benefits that a new lock would generate.

Hypothesis II. The new lock would not be completed until 2010; project benefits should be calibrated on traffic flows then, not for 2004.

According to the Corps' 1997 forecasts, there would be 26.3 million tons transiting the existing lock in 2010.[18] This traffic would generate delays of 40.7 hours per tow in 2010 and by 2060 delays would reach 60.2 hours.[19] The delay forecasts for 2010 are 3.6 times the actual delays in 2004; the forecasted traffic is 1.4 times the 2004 amount. Since delays are essentially the product of these two variables,[20] the cost of delays using the 2010 forecast would be 5.0 times the costs based on 2004. Hypothetically, this would bring total delay costs to $64 million an amount that exceeds the NED project's average annual costs.

The trends in (actual and Corps' forecasted) tonnage and delays for 1990-2010 are displayed graphically above (Figures One and Two). Through 2005, the actual values are trailing far below the forecasts and the forecasts continue to rise beyond 2005, especially delays. In light of the historical experience, it seems virtually impossible that either of the forecasts will be remotely met.

[18] Corps 1997 Report, Appendix E, p 175.
[19] Corps 1997 Report, Appendix E, p 167.
[20] Changes in tons per tow could affect this calculation, but are ignored here.

Hypothesis III. The Corps' estimates of barge and tow waiting costs are too low.

In this paper we have derived an estimate of a tow's average hourly waiting costs by combining the Corps' estimated cost per thousand tons of cargo and the published statistics on tons per tow at the Industrial Canal Lock. The analysis yielded an average cost of $132 per tow per hour. Any claims that this number is "too low" should be evaluated first by recognizing that it represents the hourly cost as of 1996. We used "1996 prices" so that we could compare the benefits to project costs. As pointed out above, the costs of the NED plan have not been updated since the Corps' 1997 Report.[21]

If the Corps' models were used to derive an estimate of tow waiting costs based on 2007 price levels, the average cost would no doubt be higher, However, the higher cost must then be compared to an updated (and therefore higher) cost estimate of project construction.[22] There is no evidence that barge waiting costs have grown disproportionately to the cost of construction, nor is there anything in the public record that suggests criticism of the Corps' cost models as they were developed and used for the Corps' report. Calibrating both costs and benefits to 2007 price levels will not change the conclusions of this study.

Hypothesis IV. Other benefit categories (such as reductions in vehicular traffic delays) are sufficient to keep the project viable.

As explained above, the shallow draft navigation benefits attributable to reductions in delays constituted 80.5 percent of the total. If these benefits are as low as one fourth of the Corps' estimate there is not enough left to justify this project. Two of the remaining four potential benefit categories (13.8 percent) were a consequence of the need to make major repairs to the existing lock that were scheduled between 1998 and 2002. Indeed, most of these repairs have been made; in fact, the high hourly delays observed in 1998 were a direct consequence of a significant repair closure. To the extent that these repairs have been made, these benefits are also "off the table." A fourth category, deep draft benefits is zero for the NED plan which is a shallow draft lock. This leaves only the benefits to vehicular traffic of replacing existing bridges with new structures that reduce traffic delays (5.7 percent), clearly not enough to keep the project economically viable.

[21] Recall that the NED plan is not the recommended plan; therefore the Corps had no reason to re-estimate the costs of this alternative.

[22] A comparison of the construction cost estimate for the recommended plan in the 1997 report ($461 million) with the Corps' FY 2007 Enacted Fact Sheet ($804 million) shows an increase of 74 percent. The average annual costs for the NED plan have probably increased by the same order of magnitude.

Hypothesis V. The analysis does not account for traffic that has left the river because of the current level of delays. Without delays, this traffic would return; benefits should be associated with the delay-diverted traffic.

Project proponents acknowledge the statistical reality that commercial tonnage locked through the Industrial Canal has declined in the decade since the Corps completed its study. Ken Wells of the American Waterways Operators in his 2001 paper cited earlier gives three reasons for the loss of traffic:

- Coal shipped by water to electric utilities east of New Orleans had shifted to rail or to a foreign source and natural gas electricity generation has become a more viable competitive option.

- The trends in traffic mirrored a downturn in the economy.

- Delays at the Industrial Canal Lock have induced shifts to other modes, just as the Corps predicted.

He anticipated the possibility that coal traffic would return and expressed his expectation that an economic upturn would cause some upturn in other water traffic. But he feared that traffic lost to delays would be permanently lost if the old lock was not replaced.

The data shows that coal shipments in 2001 sited by Wells were less than half the amount in 1996, and this traffic has not returned. By 2004, it was roughly 2/3 of the amount shipped in 2001 and the figures for 2006 are roughly half the 2004 amount. The trade offs among fuels, fuel sources and transportation modes are critical to the electric utility industry. Recent requirements for cleaner burning fuels have become a major factor in these decisions. Clearly, utilities located in the southeastern United States are not choosing to use coal shipped by barge through the Industrial Canal and there is no evidence to suggest a likely reversal of this trend.

Wells' 2001 data coincides with the U.S. Recession of 2001 that ended, according to the National Bureau of Economic Research in November, 2001. If traffic through the Industrial Canal is positively correlated with over all economic activity, the years 2002-2006 should have been years of growth. Yet even if the decline in coal traffic is excluded, the 2006 data for all other commodities shows that traffic is off by an additional 8 percent since 2001.

Wells considers the traffic diversions due to lockage delays to be the most serious problem. He points out that one would expect shippers to be discouraged by the delays in delivery and by the higher shipping rates that must be charged to cover the costs of delay. He correctly identifies shifts to alternative modes as a part of the Corps over all analysis used to estimate project benefits in the Corps' 1997 report. However, Wells' paper does not provide any information as to either the Corps' or his own estimate of the amount of traffic likely to have been diverted. Therefore he cannot estimate the economic magnitude of this impact.

The expected diversions were forecast by the Corps by adding the costs of delay to the "no delay" or uncongested barge transportation rates and comparing this to the uncongested rates of shipping by alternative modes or routes. The traffic is diverted only if the uncongested barge shipping rates plus delay costs are more than the rates for the least cost alternative.

The table below shows the Corps' traffic forecasts, including estimated diversions, for 2000 and 2010 and compares this to the actual amount of traffic using the lock in 2004:

Table Three.

	2000 (Forecast)	2004 (Actual)	2004 Actual as Percent of 2000 Forecast	2010 (Forecast)
Tonnage through lock (mil. tons)	25.531	18.663	73%	26.277
Average delay per tow (hours)	25.3	11.35	45%	40.7
Probable diverted tonnage (mil. tons)	0.604	?	N/A	3.534
Total tonnage thru lock & diverted (mil. tons)	26.134	?	N/A	29.811
Diverted tonnage as percent of total	2	?	N/A	12

Source: Forecast tonnage through lock, Corps 1997 Report, p E-175, forecast average delays per tow, p E-173, forecast diverted tonnage, p E-177. Actual data for 2004 obtained from Lock Performance Monitoring System, available at http://www.iwr.usace.army.mil/ndc/lpms/lpms.htm

The table shows that the actual tonnage in 2004 was 73 percent of the predicted 2000 amounts and that the average delay was less than half of the 2000 forecast. Yet the Corps' model predicted that only 2 percent of the potential demand for the lock would be diverted in 2000. The table also shows that the Corps forecasted only a 12 percent diversion of traffic even when average delays increased to 40 hours per tow. These comparisons lead to two possible scenarios. Either:

- Scenario One: If the Corps accurately measured the transportation cost differentials between transportation modes, the amount of "delay induced" diverted tonnage in 2004 would have been a trivial percentage of the total; or

- Scenario Two: If, as Wells suggests, there have been substantial diversions of traffic, the Corps' cost differentials between transportation modes were seriously overstated.

In the Corps' model (Scenario One), the assumed uncongested rate differentials are large.[23] That is why it is assumed that most of the traffic will continue to use the Industrial Canal Lock even as the average hourly delay approaches 40 hours and beyond.[24] Preventing such delays by building a new lock generates large benefits to this traffic. But if there are relatively more competitive shipping options than those considered by the Corps (Scenario Two), not much is gained, from a national economic perspective by eliminating lock delays. Any argument that there have been substantial diversions due to current delays at the lock must conclude that the Corps' cost differentials are significantly overstated. This actually hurts rather than helps the economic case for the replacement lock. Hypothesis V is no more persuasive than the previous four.

Hypothesis VI. The Government has already spent considerable amounts on this project. This money would be wasted if the project is not completed. The benefits accruing to the project should be compared to the remaining costs in order to determine whether or not to proceed.

According to the Corps' Enacted Fact Sheet dated 30 March 2007, the federal government has already spent $125 million on this project. This represents 17 percent of the total federal share. We have estimated, as reported above, that on a total project basis, the federal government and the local sponsor would be paying $4.00 of every $1.00 of benefits received. If 17 percent of project costs are considered sunk, the ratio of future payments to benefits falls, but there remains $3.30 spent for every $1.00 obtained.

It is unfortunate that so much money has been spent on such an unworthy project. But wasting more money will not make this project economically viable.

[23] The net cost savings per ton are displayed in Table 4-7, p E-123 of the Corps' 1997 Report. They range from $2.44 for coal to $25.40 for metallic ores. The values in Table 4-7 are in 1992 prices.
[24] As Table Three shows, when average delays reach 40 hours in 2010, the amount of diverted traffic is still only 12 percent of the total.

ANALYSIS OF THE "LOCALLY PREFERRED "DEEP DRAFT" LOCK

Even though the "NED" project is no longer economically viable, should the Corps proceed to build the "recommended" larger and deeper lock?

The analysis here has focused so far on the NED alternative because if it cannot pass the basic economic test, then there is no basis for selecting any other alternative. The recommended lock is deeper and longer. No doubt, one important factor in the Corps' recommendation was that the current lock, with a depth of 31.5 feet, can accommodate deep draft vessels; the NED lock, at a 22 foot depth, could not. By comparison, the recommended "deep draft" lock would allow a continuation of this service. However, by deciding to accommodate deep draft traffic, the Corps agreed to pay a high price for very little in return.

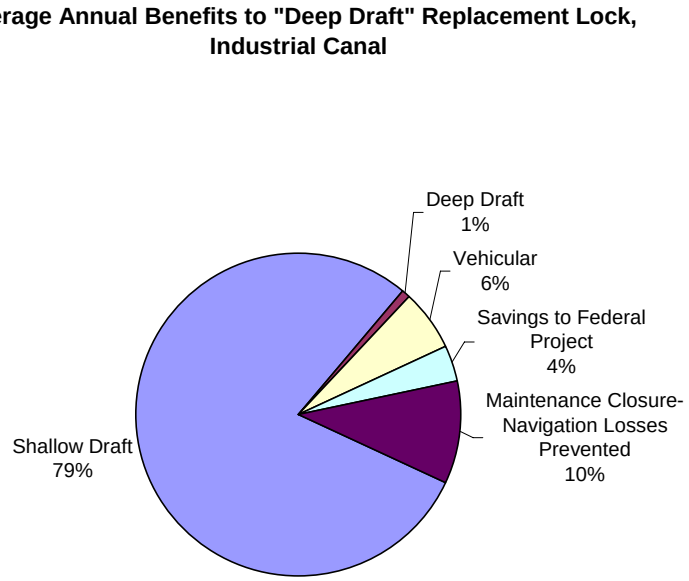
The Corps estimated that moving from the smaller NED lock to the larger lock would increase average annual costs by $10.243 million a year.[25] At the same time, average annual benefits would only increase $6.048 million.[26] Furthermore, the benefits attributable to deep draft navigation are only a small fraction of this total and, as new traffic data shows, the Corps' 1997 forecasts of deep draft benefits are probably far too optimistic.

The projected benefits to deep draft navigation are only one percent of total benefits. The incremental deep draft benefits (comparing the deep draft to the NED lock) are only 16 percent of the incremental total.[27] The recommended lock is also longer and can accommodate more vessels (including barges) in a single lockage. Consequently, the shallow draft total is 67 percent of all incremental benefits. The recommended lock's description as a deep draft lock hides the important fact that a vast majority of both total and incremental benefits are for barge traffic.

The distributions of benefits among the five benefit categories described earlier are displayed below. Figure Eight displays the total benefits expected to accrue to the recommended lock. Figure Nine shows how the incremental benefits are distributed (benefits that accrue as a result of shifting from the NED lock to the recommended lock).

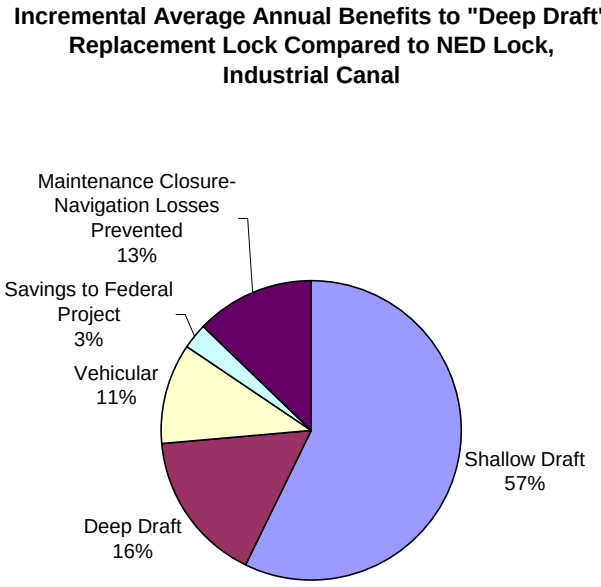
[25] Corps 1997 Report, Appendix E, p E-270. The amounts compared are for the alternatives with bridge curfews remaining in place.
[26] ID. Since the incremental costs exceed the incremental benefits, the recommended project would generate a smaller economic return than the NED project.
[27] Possibly, some portion of the "maintenance closure navigation losses prevented" might be attributed to deep draft traffic, but it would be a small percentage of the total.

Figure Eight.



Source: Corps 1997 Report, p E-267

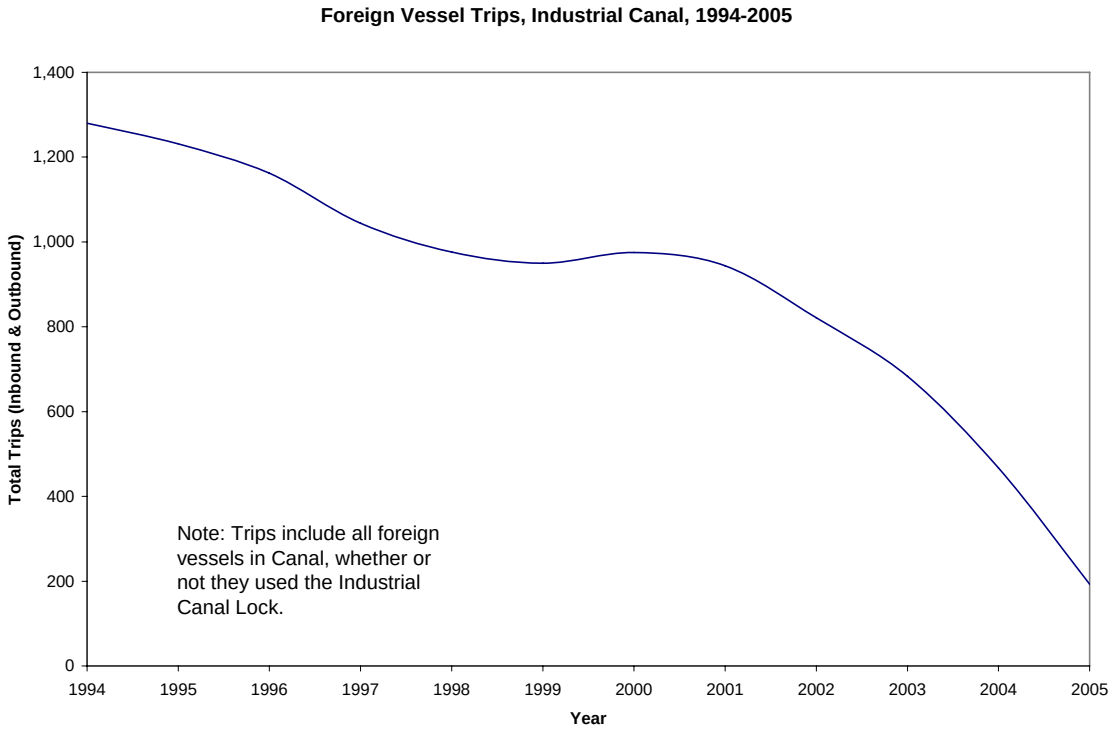
Figure Nine



Source: Derived from Table 10-6, Corps 1997 Report, p E-267.

The Corps estimated average annual deep draft benefits are based on its forecast that with the existing lock remaining in place, total deep draft lockages would grow from the observed number of 138 in 1991 to 162 in 2000 and 194 in 2010, roughly two percent per year.[28] The public lock data does not include information on the number of deep draft ships using the lock. If, as is likely, it is correlated to the total number using the Industrial Canal (although most of the vessels used the Mississippi River Gulf Outlet Channel to both enter and leave the Industrial Canal) the number of deep draft trips in the Industrial Canal can be used as a proxy for deep draft lock activity.[29] Figure Ten below shows the trend in the total Industrial Canal trips of deep draft vessels, 1994-2005. The decline in traffic, roughly 10 percent per year through 2004, is not consistent with the forecast growth envisioned by the Cops in its 1997 report.

Figure Ten.



Source: Corps of Engineers Waterborne Commerce Statistics, data for 2001-2005 available at http://www.iwr.usace.army.mil/ndc/wcsc/wcsc.htm

The Corps' recommendation to build a project with lower net benefits than the NED plan was premised on the local sponsor's agreement to pick up the additional costs:

[28] Corps 1997 Report, p E-221 (Table 8-24).
[29] Data are from Waterborne Commerce Statistics, "Trips and Drafts of Vessels" and include all "foreign" vessels regardless of draft.

> "The deep draft increment will be the responsibility of the local sponsor, the Port of New Orleans, since the increment is not justified on its own.... The incremental cost to construct the recommended plan, the deep draft lock, is estimated to be $68,300,000. That is the cost to the local sponsor. The Port of New Orleans owns the real estate required for this project and will be given credit for these lands, presently estimated at $45,200,000, towards their requirement for this project."[30]

This apportionment is fully consistent with Corps policy as outlined in its Planning Guidance Notebook:

> "If the sponsor prefers a plan more costly than the NED plan..., and the increased scope of the plan is not sufficient to warrant full Federal participation, ASA(CW) [the Assistant Secretary of the Army, Civil Works] may grant an exception as long as the sponsor pays the difference in cost between ... [the NED] plan and the locally preferred plan."[31]

Why would the local sponsor agree to pick up the costs of the non-economic portion of the project? As we have just pointed out, the sponsor's original expected cash requirement was to be only $23.1 million (($68.3 million less $45.2 for land owned). However, after the report was completed and approved, it was determined that the report contained a significant error that vastly understated the Port's cash requirements. This mistake was acknowledged in a Supplement Report dated September 20, 2000:

> "The 1997 Evaluation Report in the Syllabus in the front of Volume 1, contained a statement that '... The Port of New Orleans owns the real estate required for this project and will be given credit for these lands, presently estimated at $45,200,000 towards their requirement for the project.' Using the $45.2 million figure cited in Volume 1 of the Report, the Port's required cash contribution toward the deep draft increment would have been $23.1 million. The Port has stated that it used that figure to prepare their financial plan to support this project. Unfortunately, that statement in the Syllabus was in error."[32]

As discussed in its 2000 Supplement Report, the Corps later concluded that the port did not own all of the land needed for the project; in fact the value of the Port's portion was only $16.73 million. Thus if the Port were to meet its commitment, it would be required to make a cash outlay of at least $51.6 million.[33] The significant impact of

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[30] Corps 1997 Report, Overview, available at http://www.mvn.usace.army.mil/prj/ihnc/EvaluationReport/ihnc_eval.htm, (there are no numbered pages).
[31] Army Corps of Engineers, "Planning Guidance Notebook (ER 1105-2-100)," April 23, 2000, p 2-8, available at http://www.usace.army.mil/publications/eng-regs/er1105-2-100/toc.htm.
[32] Army Corps of Engineers, "Mississippi River – Gulf Outlet New Lock and Connecting Channels (Inner Harbor Navigation Canal Lock Replacement) - Evaluation Report- Supplement No. 1 (September 20, 2000), p 2. This report is hereinafter referred to as the "2000 Supplement Report."
[33] This estimate is based on "1996 prices." With inflation, the cash outlay would be even greater. (as shown in the text following this footnote).

this error led to a reconsideration of the cost sharing arrangement. The Corps was able to "constructively" reinterpret authorizing legislation and conclude that the Port should only be asked to contribute 35 percent of the incremental costs. As a result, the Port's obligation (based on 1996 dollars) was reduced to a land contribution of $16.7 million and a cash contribution of $7.2 million.

Unfortunately, the 2000 Supplement Report introduced a new error into the cost sharing calculations. It required that the Port pick up 35 percent of the incremental costs, while the Corps was required to pick up 75 percent.[34] The two parties between them were thus required to pick up 110 percent of the total incremental costs. This effectively shifted some of the project costs from the shallow draft NED lock to the deep draft recommended lock. One consequence of this shift was to reduce the amount required to be paid by the Inland Waterway Trust Fund at the expense of the general taxpayer.

With the delay in construction and inflation, total project costs are now estimated to be $804 million[35] While the Corps' budget document containing this information does not include an estimate of the Port's current cash contribution requirements we have derived an estimate of $22.5 million. At the same time, the Corps' share of the incremental costs would be $84 million. The derivations of our estimates are shown in Table Four on the page following.

The bottom line is that the decision to revise the cost sharing formula and build a project with incremental costs exceeding incremental benefits (in comparison to the NED project), would wind up costing the federal government an additional $84 million. At the same time, the Port is being asked to make a smaller cash contribution than the amount forecast in the original 1997 study even though the project cost estimate has increased by 50 percent.

Why would the barge transportation industry support the non-economic portion? As Figures Eight and Nine above demonstrate, they and their customers would be getting the majority of the benefits from the incremental project at no cost to them, not even indirectly through the Inland Waterway Navigation Trust Fund. In fact, unless the error in the 2000 Supplement Report is corrected, the required Trust Fund payments are even lower than the amounts needed to build the NED lock.

[34] Corps of Engineers 2000 Supplement Report, p 5.
[35] Corps of Engineers "Enacted Fact Sheet," March 2007 available at http://www.usace.army.mil/cw/cecwb/budget2008/fy07_enacted_fact_sheets.pdf, p B-100. Total project costs include both the shallow and deep draft portions.

Table Four. Local and Federal Shares of Incremental Construction Costs, Locally Preferred (Deep Draft) Project Compared to NED Project, from Initial Estimate to Most Recent Estimate. All Figures are in Millions of Dollars.

Basis of Estimate	Construc-tion Cost of NED Project (A)	Construc-tion Cost of Deep Draft Project (B)	Incremental Construc-tion Cost = (B)–(A)	Port of New Orleans Share of Incremental Costs: Total	Value of Land Contrib-uted	Cash Require-ment	Federal Share of Incre-mental Costs
Corps 1997 Report, October 1996 Price Levels	299.6	$367.9	68.3	68.3	45.2	23.1	0
Correction to 1997 Report contained in 2000 Supplement Report (before revised cost sharing)	299.6	367.9	68.3	68.3	16.7	51.6	0
Revised Cost Sharing Arrangement per 2000 Supplement Report	299.6	367.9	68.3	23.9 3/	16.7	7.2	44.4
October 1999 price levels as reported in 2000 Supplement Report	338.7 1/	425.7	79.0	27.7 3/	16.7	11.0	59.3 4/
Fully Funded Estimate (includes inflation beyond 1999) in 2000 Supplement Report	412.1 1/	517.9	105.8	33.7 3/	16.7	17.0	72.1 4/
Fully Funded Estimate in March 2007 Enacted Fact Sheet	479.9 1/	603.1 2/	123.2	39.2 3/	16.7	22.5	84.0 4/

1/ Revised cost estimates for the NED plan are not included in the 2000 Supplemental Report or the 2007 Enacted Fact Sheet. Values reported in table are "deep draft construction costs" minus Port and Corps "shares of incremental costs" as determined by 2000 Supplement Report and displayed in this table

2/ 2007 Enacted Fact Sheet includes total project costs = total construction costs + "LERRD and mitigation costs" = $804 million. We assumed "LERRD and mitigation costs" would be 25 percent of total, construction costs 75 percent ($603.1 million).

3/ Revised cost sharing arrangement per 2000 Supplement Report: Port picks up 6.5 percent of total construction costs as its share of incremental costs.

4/ Revised cost sharing arrangement per 2000 Supplement Report: Corps picks up 13.92 percent of total construction costs as its share of incremental costs.

How should the deauthorization of the Mississippi River Gulf Outlet (MRGO) Channel affect our conclusions?

The 2007 Water Resources Development Act (WRDA), which became law in November when Congress over rode a presidential veto, includes a provision deauthorizing the Mississippi River Gulf Outlet Channel. It also provides funds to support both public and private deep draft port interests to relocate from the channel to the Mississippi River. This obviously has important implications for the nature and location of the deep draft shipping industry within the full New Orleans port area, including the Mississippi River.

In traditional Corps of Engineers analysis, the closure of MRGO creates new "project alternatives" that were not considered in the 1997 study. In both the "with project" and "without project" condition, the Industrial Canal becomes the only transit route for deep draft vessels that once routinely entered and exited the Port via MRGO. The inclusion of relocation funds in WRDA is a direct consequence of this limitation.

When these important developments are factored into all of the other changes that have occurred to New Orleans and to potential navigation users of the Industrial Canal, it is a theoretical possibility that the locally preferred "deep draft" lock has somehow become the NED alternative, and that the project would be economically justified. But this unlikely proposition has never been rigorously tested.

It seems intuitively obvious that a tradeoff analysis comparing a new deep draft lock on the Industrial Canal to relocating businesses that support deep draft navigation would lead to the conclusion that one or the other approach would yield the most National Economic Benefits, but that a commitment to both approaches would yield investment redundancies. The investment yielding the greatest net benefits should be **either business relocations or replacement of the current lock, but not both**. When this comparison is made, it is important to keep in mind that keeping the existing lock would still leave deep draft access to any facilities choosing not to relocate.

Yet the language of the 2007 Act explicitly recognizes that the Act does not change the current authorized status of the Industrial Canal Lock project. The may represent a curious political compromise, but it is totally devoid of any analytical justification. This is yet another compelling reason why the Corps of Engineers should be required to conduct a thorough economic reanalysis if it is going to continue to recommend and support replacing the existing lock.

The Corps has concluded that if a single deep draft shipping lane were maintained in the MRGO Channel, the expected level of deep draft traffic using the channel would not generate enough transportation savings even to cover the annual cost ($12.5 million) of the Corps' operation and maintenance activities.[36] The low levels of traffic projected

[36] Corps of Engineers, MRGO Deauthorization Report, June 2007, p. B-18, available at http://mrgo.usace.army.mil/MRGO%5CPublications%5CMRGO-

with a reopened MRGO represent a maximum base level that might transit the lock if MRGO remained closed. However, no doubt many of the deep draft related businesses will relocate because of the deauthorization of MRGO, thereby substantially reducing the remaining traffic transiting the lock. Given the deep draft lock's incremental construction costs ($68 million in 1996 dollars, possibly $123 million fully funded in 2007) and the likely minimal level of deep draft traffic, the deeper lock would, in all likelihood, fail the basic economic test of any serious reanalysis.

When the 1997 report was issued, it might have been argued that it didn't really matter whether or not the large lock made economic sense from the federal perspective. After all, the local sponsor (Port of New Orleans) had agreed to pick up all of the difference in the cost of the two project alternatives. Since then, as we have shown, most of the incremental costs have become a federal responsibility. In such circumstances, there is simply no justification for proceeding with this project without a fuller understanding of the economic consequences.

CONCLUSION: THE NEXT STEP

Certainly the Corps' 1997 report does not provide even a scintilla of evidence supporting the economic justification of a replacement lock in the Industrial Canal. This result is illustrated in Tables Five (for the "NED" project, the project with the highest net benefits) and Six (for the recommended "deep draft" project).

Table Five

Project Economics, NED Project (Highest Net Benefits):

	Average Annual Costs	**Benefits from Delay Reductions 1/**	Other Benefits	Total Benefits	**Benefit Cost Ratio**
The View from 1997	$51.0 million	**$94.5 million**	$9.9 million	$104.4 million	**2.05**
The View from Today	$51.0 million	**$12.7 million**	$9.9 million	$24.4 million	**0.44**

1/ Includes Corps' Shallow Draft and "Maintenance Closure, Navigation Losses Prevented" benefits

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3D%20LEIS%20Appendices%20July%202%202007.pdf. Average annual transportation savings (deep and shallow draft) were estimated to be $6.2 million, less than half the cost of O&M. The incremental O&M cost between a shallow draft and deep draft one lane channel was estimated to be $6.5 million. The transportation savings attributable to deep draft only were $2.5 million.

Source: Corps of Engineers 1997 Report, pp E-267 and E-270.

Table Six

Project Economics, Recommended "Deep Draft" Project:

	Average Annual Costs	**Benefits from Delay Reductions**	Other Benefits	Total Benefits	**Benefit Cost Ratio**
The View from 1997	$61.2 million	**$98.7 million**	$11.7 million	$110.4 million	**1.80**
The View from Today	$61.2 million	**$12.7 million**	$11.7 million	$24.4 million	**0.40**

1/ Includes Corps' Shallow Draft and "Maintenance Closure, Navigation Losses Prevented" benefits

Source: Corps of Engineers 1997 Report, pp E-267 and E-270.

According to Corps planning guidance principles the minimum Benefit Cost Ratio needed to justify a project is 1.00. Because of the current backlog in constructing authorized projects, the Corps will not budget for projects with a Benefit Cost Ratio less than 1.50, unless they are flood control projects that address significant risk to human safety.[37] The proposed replacement does not come anywhere near meeting either of these basic economic tests. These findings create serious issues regarding what should be done next.

The Corps' approach

The Corps of Engineers recognizes that there are cases where circumstances change during both the study and early construction periods for a project. Its general policy is clearly outlined in the guidance provided to Corps field personnel regarding development of the proposed Civil Works budget:

[37] See, for example, testimony of the honorable John Paul Woodley, Jr., Assistant Secretary of the Army (Civil Works), before the Subcommittee on Water Resources and Environment Committee on Transportation and Infrastructure, United states House of Representatives, on the Army Civil Works Program, Fiscal Year 2008, February 14, 2007, pp 16-17, available at http://www.usace.army.mil/cw/cecwb/testimony/fy2008/2008woodley_test.pdf

> "A current economic analysis for each new construction candidate must be approved not earlier than 3 fiscal years prior to the fiscal year of the submission of the program request…. This will ensure the analysis can be considered current when the actual program decisions are made and help preclude the need for an additional update prior to an implementation decision….
>
> For older projects, and projects under continuing construction where significant changes have occurred following initiation of construction, an economic update should be performed in PY-2 [i.e., two years before the budget year when funding is requested] for both total costs and benefits, and remaining costs and benefits to be used in continuing budget decisions."[38]

It is hard to understand why these standards are not being applied to the Industrial Canal Lock project. The postings on Corps web sites suggest an awareness of the problem but a reluctance to deal fully with the consequences. Most of these postings are a few years old, but they apparently remain relevant since they are still posted:[39]

> Q: Why did the Corps of Engineers decide to perform a data review of the cargo tonnage using the Industrial Canal Lock?
>
> A: Tonnage through the existing lock has been slowly declining compared to the projections shown in our 1997 Evaluation Report and in the last couple of years there has been a sharper decline. 11/18/2002
>
> Q: How much did tonnage decline?
>
> A: By 14.1 percent in the most recent year. Tonnage declined from 18.4 million tons in 2000 to 15.8 million in 2001, as reported by the Corps' Waterborne Commerce Statistics Center, 11/18/2002
>
> Q: Who would perform the data review?
>
> A: A private contractor will do the data review. It has yet to be selected. 11/18/2002
>
> Q: How long will selection take?
>
> A: We expect selection to take a couple of months. 11/18/2002
>
> Q: What would happen next after the data review?

[38] Corps of Engineers Budget Guidance, EC 11-2-187, May 10 2006, pp B-2-3 and B-2-4.
[39] The 'frequently asked questions" reproduced in the text are from http://www.mvn.usace.army.mil/pd/projectsList/faq.asp as available on June 11, 2007.

A: If the data review indicates it is appropriate, the Corps will initate (sic) additional studies to see how this decline in tonnage affects the economics of the project. 11/18/2002

Q: Will work on contracts be stopped in the meantime?

A: No. We desire to maintain the critical path, doing those things without which the project would fall seriously behind schedule. Ongoing construction contracts, two demolition contracts worth about $24 million, wil (sic) be completed. Another contract to test the feasibility of using the new technology of "lime-soil-cement mix" columns to support levees in the area will also be completed. Additional contracts that are on the critical path will be awarded as required. We spent $17 million in the fiscal year that ended Sept. 30, 2002, and expect to spend $15 million in fiscal year 2003. 11/18/2002

Q: Is it possible that one result of studying the new cargo data could be the cancellation of the Industrial Canal Lock Replacement project?

A: Not from the initial data review. If additional studies wee (sic) warranted after the data review, the results of those studies would be presented to Congress. The Corps has no authority to cancel the project under the current Project Cooperation Agreement with the local sponsor, the Port of New Orleans. If the results indicate that the project does not meet requirements, then Congress would decided (sic) if this project would be cancelled. 11/18/2002

The data sited by the Corps in these "frequently asked questions" ends in 2001. As we have pointed out, there have been substantial declines in water traffic since then. Even the Corps' tentative "conclusion" that cancellation would not be recommended "from the initial data review" is clearly in need of a second look. From a public policy perspective, it is troubling that the Corps feels it has no authority to cancel the project, even if the facts no longer justify its construction, and appears to be basing its recommendation for going forward partly on this fact.

A later reference to a new economic study is contained in the Corps' Fiscal Year 2004 budget justification sheet for this project:

"An economic reevaluation of the project is being performed and is scheduled for completion in Fiscal Year 2005."[40]

If new studies have been performed they have not been made available to the project's critics.

[40] Corps of Engineers Budget Justification Sheet for Inner Harbor Navigation Canal Lock, Fiscal Year 2005, available at http://www.usace.army.mil/cw/cecwb/just_states/just_2005/mvd.pdf, p 60.

A better approach

It is time to acknowledge that, based on existing studies; this project no longer makes economic sense. The logical action that follows from this conclusion is to halt all construction activities and deauthorize the project. The only reasonable alternative is to conduct a thorough reanalysis that is based on the realities of the tonnage and delay data now available as well as the current economic, environmental and cultural circumstances of the City of New Orleans.

If such a study is undertaken, it is essential that it be subject to rigorous independent peer review. Independent peer review has become an integral part of the Corps culture for controversial projects. Important examples include the National Academy of Science for the proposed replacement of Upper Mississippi River Locks and the Interagency Performance Evaluation Task Force created by the Corps to evaluate the events related to Hurricane Katrina. Specific recommendations for independent review are contained in the Corps' Civil Works Strategic Plan[41] and in the Corps' recent press release "12 Actions for Change."[42] Such an approach is clearly called for in a controversial project such as the Industrial Canal Lock. We recommend and urge that if further studies are pursued, a truly open approach be adopted, one that involves at least:

- an independent review team that produces its own report;
- public access to the data and models used in the analysis;
- opportunities for public input by project critics into the work of the review team as well as to the Corps itself; and
- inclusion in the public record of all questions submitted by outside stakeholders and the Corps' full response (including data support) to each question.

Only in such circumstances will the public have the full confidence in the study's conclusions.

This project's economics are only one element in the full evaluation required for this project. To this must be added the environmental and community impacts. Yet by itself, the economic analysis calls into serious question any decision to move forward with construction. The Corps and project proponents can no longer hide behind a study that is hopelessly out of date and argue that its conclusion make even a marginal case that this project should go forward.

[41] Department of the Army Corps of Engineers, Civil Works Strategic Plan, Fiscal Year 2004- Fiscal Year 2009, March 2004.
[42] U.S. Army Corps of Engineers, "Corps Points!" 25 August 2006.