

STRUGGLING NAVIGATION PROJECTS: BIG COAL'S CALL TO ARMS

Lock and dam development in the United States moves along at a glacial pace, and it seems to be going slower every day. Locks and dams are mechanical systems that wear out with time, and the coal industry has a vested interest in their long-term reliability. These systems are also a storehouse of incredible potential energy, capable of unleashing tremendous destructive power downstream if not properly maintained. Is the coal industry, a major beneficiary of barge transportation, putting its sizable muscle behind the effort to help improve the development of water navigation systems? The “we” in the title is “us”, the coal industry—“we” need to help!



Photo by URS/Alberici JV

**Figure 1. Olmsted Locks and Dam Project
Concrete Shell on Cradle Being Lowered to Water's Edge**
*Approximately 20 miles downstream from Paducah, Kentucky
(Ohio River Mile 964.4, in Pulaski County, Illinois.)*

Olmsted Locks and Dam-The King of the Corps' Navigation Projects

The Olmsted Project sits at the lower end of the Ohio River containment system, 964 miles downstream from Pittsburgh, PA. In many respects the Project represents new technology and new equipment. The construction of the dam is taking place "in the wet", which means the requisite concrete shells are constructed on land and set in place in the flowing river. Sonar and video imaging systems guide the movements of mammoth cranes to tolerances of ¼" or less to make this assembly method work.

The drop in elevation from Pittsburgh to Olmsted is about 450 feet, which means the system of twenty dams may be storing an enormous amount of potential energy, literally enough energy to destroy every bridge and river city from Olmsted to the U.S. Gulf if even a fraction of its total energy were to be released. The last locks and dams in the system are Locks and Dams 52 and 53. Deteriorating structurally, they have no steel reinforcements and are 50 to 100% stressed under **normal** operating conditions. Combined, these dams hold back a wall of water that is about 50 feet high. Were either to begin failing, it may not be possible to evacuate Olmsted before total failure of both dams and releases a water wave 25 to 50 feet high.

The Olmsted Locks and Dam Project site currently looks like a small city (Figure 2) dedicated to the production of specialty rebar and concrete shells, and to building a 2700' dam across the flowing Ohio River. For the purpose of installing these 3700-ton shells the Project uses two of the world's largest cranes, one a land-based crane and the other a mammoth floating crane. In spite of their size, however, they are capable of setting slabs to very precise tolerances in the fast-flowing current of the Ohio River.

Because of the precision required reinforcing bars (rebars) are all fabricated on the Project site. Each of the concrete shells is entirely constructed on site and moved to the water's edge using a ten-story gantry crane on wheels (Figure1). A total of 36 shells will be required, each being precisely placed on the river bottom by a mammoth floating crane and pinned in place by 2-foot diameter piles. This is a high-tech operation that exceeds in size and complexity many of the projects depicted on the Discovery

Channel's Mega Machines TV programs. Concrete shells that may be as large as 103' X 125' and weigh as much as 4996 tons are handled with almost surgical precision.



Photo by URS/Alberici JV

Figure 2. Overall View of Casting Yard, Olmsted Locks and Dam Project

While I was meeting with a barge company executive recently he received a call on his cell phone. I heard him say, "fifty-two at fifty-two". When he got off the phone I said, "I couldn't help but overhear a curious part of your conversation. May I ask what you meant by the term "fifty-two at fifty-two"? He said, "Oh, what I meant was there are 52 barge tows backed up at Lock and Dam 52." "WHAT?" This was a shock to me, but apparently he was numb to it, like a soldier gets numb to the death of friends in combat.

I was dumbfounded. It was good weather. There was no high water, no ice in the river, no obvious reason for such a tremendous backup. What is it about this lock and its nearby brother, Lock and Dam 53?

The 2008 tonnage at Locks and Dam 53 and 52 totaled 76.1 and 90.0 million tons, respectively, worth over \$17 billion; 38% of this tonnage was coal. The Ohio River Main Stem Systems Study projected that Olmsted traffic will grow 141 million tons by 2030.

Olmsted Locks and Dam had been authorized by the Water Resources Development Act of 1988 to replace Ohio River Locks and Dams 52 and 53 with a single lock and dam project. Now 81 years old, these locks and rickety old wooden wicket dams are still in place, just waiting to fail. Here we were 22 years later talking about a major barge backup at Locks and Dam 52. I asked, "What happened to Olmsted? I testified before the Senate subcommittee that authorized that project years ago; I thought it had been completed." "Nope," he said, "it isn't even close." In fact, the locks were completed in 2004, but the dam is in the early stages of construction.

The temporary locks at 52 and 53 are inefficient, often shut down and are 30 years past their 20 year design life. The latest estimated total cost of the Olmsted project is \$2.124 billion, an increase of \$1.3 billion (258%) over the original estimate. As taxpayers we should be outraged. In addition, the construction completion date has been delayed from 2005 to 2016, 11 years beyond the original estimate!

Which of us as homeowners or mine owners would tolerate such delays or overruns? Yet, because locks and dams are so large and foreign to most of us in the coal industry, we somehow feel justified in telling the waterways people it is their problem when they call on us (the coal industry) requesting help, even if all they are asking is our support, our name on a list of supporters. Unfortunately, the simple failure to be counted among the supporters of a project is often regarded as being opposed to the project.

Nothing could be further from the truth than the declaration it is not our problem. It is our problem ethically if not economically. Unlike the railroads, which are necessarily private, the inland waterways belong to every citizen. If any part of the waterway system fails,

and our barges go racing down the river, we can forget about a loss of coal being our biggest worry. Our biggest worry will be those barges taking out bridge piers and bridges downstream, reading our names on a list of those being accused of bridge disasters, and being named in lawsuits. (Figure 3.)

Figure 3. Into the abyss. *The destruction of the I-40 bridge at Webbers Falls, Oklahoma is one of the worst bridge disasters in recent memory. At least 14 people were killed and an interstate highway was closed for months when a single slow-going tow boat went off course and hit a bridge pier in May, 2002, dropping the interstate bridge into the Arkansas River with drivers and vehicles. Can anyone guarantee aging dam structures at Locks and Dams 52 and 53 are not like a potential disaster, ready to release water and numerous barges to wipe out major highway bridges miles downstream?*

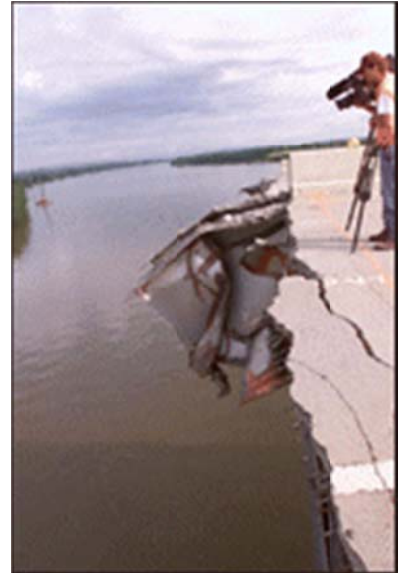


Photo by Oklahoma DOT

Lock Failure Much More Likely

While a dam failure is within the realm of possibility, it is much more likely that Locks 52 or 53 could fail. Lock 52 on the landward side was built as a temporary 1,200-foot structure with round cells, originally filled with sand and capped with concrete. Stones were put in later as filler; and about a third of the cells have recently been filled with concrete and banded with sheet metal, because they were splitting and the filler was falling out. These reinforced cells are still not as strong as the reinforced concrete walls of permanent locks like those at Smithland Locks and Dam upstream.

The locks have numerous problems: lock wall cells rusting, concrete approach walls crumbling and cracking, foundations failing, aging miter gate machinery and hydraulic piping, etc. The problems are similar at Locks and Dam 53, which is nearer Olmsted.



Figure 4. Cell Wall Oxidation at L&D 52. *If the river should rise a few feet before the hole in this cell were repaired, it could lead to total cell failure and even lock closure. Is this type of oxidation occurring below the water line, and to how many of the cells is it occurring?*

The cells aren't the only vulnerable components of these locks. The approach walls, for example, are deteriorating. As these locks age there is a growing risk that before Olmsted comes on line, there would be a failure that would shut down the river to barge traffic altogether. One can only imagine the expense, delay, and confusion that might result from off-loading our 52 barge tows should this happen.

Figure 5. Approach Walls Deteriorating. *How deep are these cracks, and what would it take to fix them? How long could traffic be stopped? How many cycles of cold weather and freezing rain can this wall withstand? The Corps does wonderful repair work every day, but can we expect miracles forever?*



The cost escalation in the Olmsted project can be linked to factors such as design and scope changes, differing site conditions, and omissions, some of which were within the Corps' control, while others, such as some of the escalation (approximately 30 percent) has been attributed to "inefficient funding".

It is apparent that the cost growth experienced at Olmsted has contributed significantly to the spend-down of the Inland Waterways Trust Fund (IWTF). Because the IWTF shares in the costs of construction and major rehabilitation of Inland Marine Transportation Systems (IMTS) projects, it needs to remain viable. Recent case studies have revealed significant inefficiencies, and have shown that the model for planning, funding, constructing, and maintaining these waterways is broken. Changes and improvements must be made in the way that inland waterways system modernization projects are conceived, funded, and delivered. The current IWTF revenues of approximately \$85 million per year cannot support the ongoing needs of the IMTS.

On November 17, 2010 Matt Woodruff of Kirby Corporation, a major tank barge operator, appeared before Sen. Barbara Boxer's Committee on Environment and Public Works to testify in support of recommendations developed by the IMTS (Capital Investment Strategy Team). They were a comprehensive, consensus-based set of proposals to address the capital investments that should be made over the next twenty years to preserve and enhance the nation's inland waterway transportation system.

These recommendations had been approved by the Inland Waterways Users Board, Waterways Council, American Waterways Operators, and National Waterways Conference. There was also a list of 200 associations and companies expressing their support. Notably absent from the list of supporters were most of the coal industry giants; the only coal company listed was Consol.

It is entirely possible that one might discover a coal company representative doing committee work in the bowels of some waterways group, but when major coal users of the inland waterway system do not sign on and give strong and obvious support, it

weakens the effort of those that do sign on. Basically, Woodruff stated, we have an aging waterways system that needs recapitalization. The current system of funding and delivery is too inefficient, resulting in wasted time and money. He is absolutely right, but he did not deal with the danger of doing nothing or the danger of diverting funds.

The contract for this project was originally won at a bid of \$350 million, which seems infinitesimal now. In fact, it was too small then. No construction company would bid on it. Based on a cost reimbursable contract, a joint venture comprised of URS and Alberici won the construction contract at \$650 million, but delays in money release have caused the project to drag on, suffering both normal escalation and price increases of essential products. It is not the objective of this article to analyze why the current estimate exceeds \$2 billion, but it is certainly in the users' and taxpayers' interest to complete this project before the estimate doubles again, and before river disasters occur.

Normally, when a construction project falls behind or stalls completely, everything comes to a halt and there are seemingly endless recriminations, but lives are not at stake. This is different. This is a race with the clock. As long as we finish before there is a failure at either Locks and Dams 52 and 53, we will be in a position at the completion of Olmsted to say there was never any danger. On the other hand that happy event is another eight years away, eight years of relentless river pounding of two weakening structures that could burst at any moment.

The waterways industry has been fighting a long-running battle to inform Congress and anyone else who would listen about the need to maintain and improve this system, but the relative quietness of the waterways system belies what is happening underwater, what parts of the system are weakening and eroding. Whether we are a member of Congress or a coal company executive, if we do not do everything we can to support the speedy completion of Olmsted and other projects in the pipeline, we are doing much more than risking some barges of coal. In some cases we may be risking the lives of people who live downstream.

Other Projects in the Works

Olmsted may be the “king” of waterways projects, but there are quite a few “princes” underway as well. Figure 4 shows graphically the priority waterways construction and rehabilitation projects. There are 240 operational locks in U.S inland waterways that are over 50 years of age, all exceeding their design lives. There are about \$4 billion worth of projects under construction, and another \$4 billion worth that have been authorized but not yet started; a \$8 billion backlog for the U.S. Corps of Engineers.

When we drive by the Ohio River and see calm waters controlled by sturdy concrete and steel structures, it is hard to imagine these structures are subject to constant wear, erosion, pounding, and failure. It is also hard to imagine that we need to be proactive to avoid disaster, yet that need has been driven home time after time in other recent water-related catastrophes: the New Orleans dike failure, the Twin Cities bridge collapse, the Taum Sauk dam collapse, and so on. Even when we are aware of such things we feed the hope that our entire navigation system is somehow impervious to failure, and we are tempted to delay, prevaricate, or just ignore the maintenance and replacement requirements altogether.

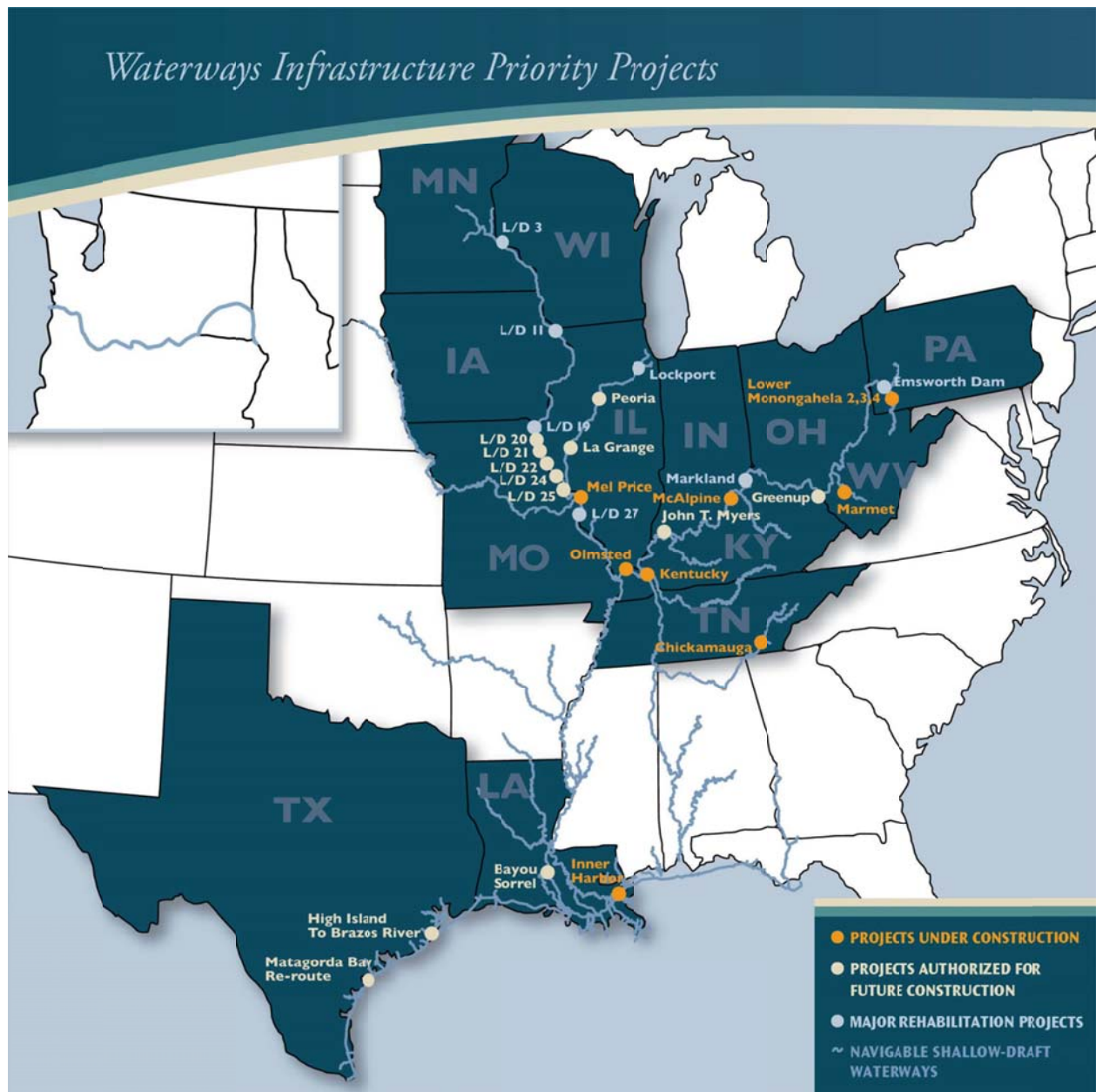


Image by Waterways Council

Figure 4
Waterways Priority Infrastructure Projects

The current system of funding and delivering projects on time is very inefficient, in great part because the US Corps of Engineers has been given additional responsibilities it did not have a few decades ago. In a following issue we will discuss the Inland Waterways Capital Development plan, a plan for prioritizing navigation projects across the entire

waterways system. This plan should improve the Corps' project management and processes to deliver projects on time and on budget. It will recommend a funding mechanism that is both affordable and meets the needs of the entire system.

Meanwhile, coal companies need to contact the waterways organizations and ask how they can support their efforts to rehabilitate and improve the navigational infrastructure on our nation's waterways. All the efforts of all of the waterways people and their current supporters would be greatly magnified by our help, and may be the impetus needed to put navigational progress on a firm track. We have long relied on the Corps to keep patching our aging infrastructure, but they cannot be expected to do miracles forever. Let's pitch in and give them our support; let's give them a call right now!

Finally, let's remember "the waterways people" really includes us, and always has. As the major commercial user of the inland waterways, and the primary justification for their maintenance, let's just remind ourselves why we believe in waterways with this video clip: http://www.waterwayscouncil.org/videos/WCI_Keep_America_Moving.wmv

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