

This publication serves as a companion or addendum to the story told in *Divine Providence: The 2011 Flood in the Mississippi River and Tributaries Project*, by Charles A. Camillo.

The Triad Once More: Restoring the MR&T System after the 2011 Flood

The condition of the [MR&T] system reminds me of the movie Rocky. Apollo Creed may have won the fight but you could never tell that by looking at him -- all swollen and spitting up blood -- afterward.

**Major General Michael Walsh
President
Mississippi River Commission
June 2011**

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In the waning days of the 2011 flood, Maj. Gen. Michael Walsh, president of the Mississippi River Commission, met with George Grugett, the legendary long-time leader of the Mississippi Valley Flood Control Association, to discuss the performance of the MR&T system and assess the future needs of the project. Even though the crest had not yet fully passed through the system, it was clear that the project had successfully conveyed one of the largest, if not the largest, floods in recorded history. At the same time, it was also clear that the monster flood had severely battered the levees, channel improvement features and water control structures comprising the MR&T system. To what degree they were damaged, no one yet knew for sure. Formal engineering damage assessments, which were scheduled to begin June 1, would eventually lay bare the true extent of the damages, yet it would take months to complete those assessments.

It was this realization that suppressed any overt enthusiasm from Walsh and Grugett. For weeks, going on months, the river had crept higher and higher on the levees. Eventually, the flood set new stage records from Cairo, Illinois, to Caruthersville, Missouri, and from Vicksburg, Mississippi, to Baton Rouge, Louisiana. As it did, the river exerted massive and unprecedented pressure loads on the earthen guardians of the highly productive valley. The 2011 flood fight had been exactly as Walsh, true to his Irish, Brooklynite roots, so aptly described as a “white-knuckle fight.” The often desperate struggles of flood fighters from the levee districts and the Corps of Engineers against severe underseepage and sloughing at levees the length of the valley – Cairo, Fulton County, Rena Lara, Lake Chicot, Francis, Winterville, Albemarle, Buck Chute, St. Joseph, Vidalia, Duncan Point – already hinted at the high level of distress on the levees. The damage assessments were sure to reveal more.

For weeks, the powerful, angry, swollen river had also directed its unyielding energy toward the concrete revetment that armors the riverbanks and, along with other channel improvement features, keeps the river from meandering aimlessly across the alluvial valley. In this regard, the channel improvements represent the first line of defense against floods by preventing the river from moving laterally and eroding the levee foundations. Never before in the history of the MR&T project had the revetment and channel improvement structures at any location on the river between Cairo and Baton Rouge faced greater river velocities and scouring effects. During the height of the flood, high water masked the extent of possible upper bank erosion and potential channel realignments, but as the river started falling, river engineers noticed distinct flow patterns at a few locations that suggested the river was trying to carve out a new channel where only land stood before the flood. Unlike the man-made cutoffs executed to lower flood stages during the early formative years of the MR&T project, any new unplanned cutoffs would unleash serious impacts to the regimen of the river and disrupt navigation because no advance measures had been taken upstream and downstream in preparation of the possible channel realignment.¹ The scale of damages to the channel improvements features



George Grugett, center, served as the Executive Vice-President of the Mississippi Valley Flood Control Association. He is pictures here with (from left to right) Sam Angel, R.D. James, Carolyn Berry and U.S. Congressman Marion Berry (AR-1).

remained unknown, but this much was certain: fixing any problems related to revetment or upper bank failures would come with significant costs.

Only the strictest of engineering controls at the Old River Control Complex, the Morganza Spillway and the Bonnet Carré Spillway prevented new stage and discharge records on the Mississippi River below Baton Rouge. Together, the structures combined to redirect 1.2 million cfs of floodwaters from the Mississippi River, which is more water than went past St. Louis during the Great Flood of 1993 and more water than most river systems around the globe pass in major floods. Even then, the power of the river below Baton Rouge reached dangerous levels. Because of the destructive power of flowing water, engineers were concerned about potential damage resulting from the immense kinetic energy of the water rushing through the aging control structures at Old River, Morganza and Bonnet Carré. Engineers held the same concerns as they watched the force of the water flowing through the intentional crevasses at the Birds Point-New Madrid floodway and over the emergency spillway at Wappapello Lake. Again, the magnitude of the damages would only become clear after the flood completely subsided, the river returned to within its banks and the engineers completed their damage assessments.

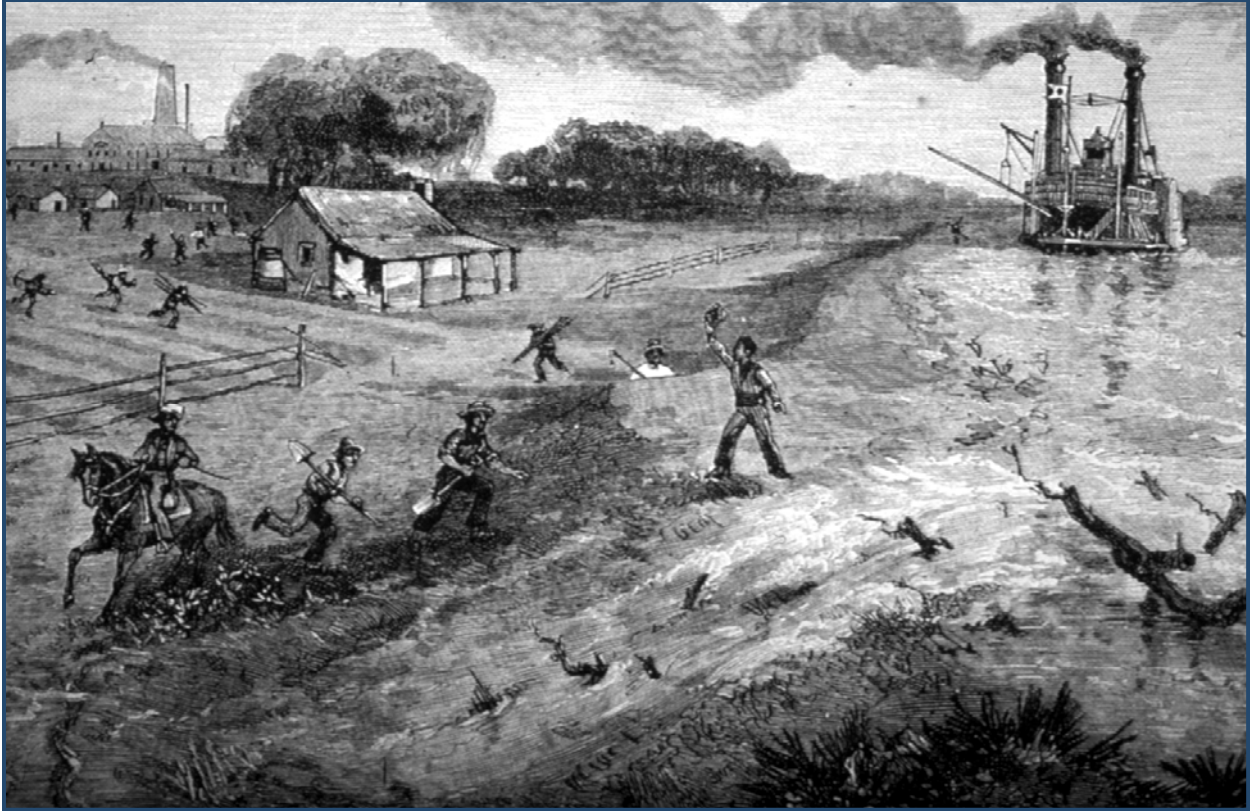
Yes, the MR&T system may have held, but it was pushed to the limit. Walsh repeatedly likened the damaged system to the fictional boxer Apollo Creed after his epic battle with Rocky

Balboa in the motion picture Rocky. “Apollo Creed may have won the fight,” Walsh explained, “but you could never tell that by looking at him -- all swollen and spitting up blood -- afterward.” Grugett understood Walsh’s point. The system was in no condition to handle another significant flood. During that late May meeting with the Mississippi River Commission president, Grugett told Walsh, “We need to secure the money so that we can put this system back together as quickly as possible.”²

The “we” that Grugett mentioned was a reference to the very same triad that he discussed in the foreword to the first edition of *Divine Providence* – the partnership forged among the people of the lower Mississippi Valley, the Corps of Engineers and United States Congress. This triad had long recognized the potential of the valley, with the “people” being the first champions. While the valley contained a vast abundance of resources – oil, natural gas, coal, diamonds, lead, timber – the real attraction for the people, the true prize for early settlers was the abundant cheap land comprised of extremely fertile soil located in close proximity to a vast water superhighway. Even the swamplands and interior regions covered with timber and full of buckshot contained deep fertile soil just beneath the surface waiting for reclamation. In fact, the soil was so deep and so fertile that it was often characterized as a “supersoil” that was unlike any other soil found in the nation, and the lower Mississippi Valley promoted as “a broad expanse of delta land more fertile than Egypt’s far-famed Nile” and “a New Eden . . . where Nature has provided a climate approaching the agricultural ideal.”

The heart of the problem experienced by the people lay at the very heart of this “New Eden” in America – the river itself. The same river that skimmed topsoil from northern lands and deposited the fertile “supersoil” in the south also devastated homes and farms when it flooded on a near-annual basis. The very river that provided convenient transportation of goods, shifted course and swallowed entire towns or cut through bends and completely severed ports from the river. The river that provided so much, could take it all away without notice. Supersoil 100-feet thick, warm weather and a longer growing season, and plentiful and evenly distributed rainfall meant nothing if surrounding farms and towns repeatedly faced inundation and the ravages of floods. To become the New Eden -- the Alluvial Empire -- the lands needed to be protected from floods, cleared of timber and drained. The meandering river also needed to be reasonably harnessed, locked into place and improved for navigation. The latter became a responsibility of the federal government early in the 19th century; flood control, however, became a local responsibility, and remained so for nearly two centuries.

The most prominent component of the triad – the people – went to work before the United States of America had even been established. The French built the first levees around New Orleans in 1717, nearly 60 years before the Declaration of Independence and 200 years before the first federal flood control act. Throughout the 18th century, the French, and later the Spanish, extended the modest levee system upstream, but placed the primary responsibility



This drawing by J.O. Davidson in *Harper's Weekly*, dated March 5, 1884, depicts the considerable risks that accompanied the advantages of reclamation.

squarely on the shoulders of riparian landowners. That tradition carried over after the Louisiana Purchase in 1803. American frontiersmen, however, soon discovered the reality that their French and Spanish predecessors had experienced – the advantages of reclamation came with considerable risk as the river continued to overwhelm any protection system put into place. Throughout the 19th century, responsibility for flood control gradually shifted from individuals to a collective extension of the people in the form of county and state governments and state-sponsored levee districts. These larger and better financed entities spent almost \$120 million by 1879, but they did so mainly on a local basis, without any true adherence to an overarching, grand scheme of protection. As such, these efforts proved largely unsuccessful because, as one noted student of the river opined, “flood waters will not respect political boundaries.”³

With the creation of the Mississippi River Commission in 1879, the second component of the triad – the engineers – entered the fray. The commission arrived as a federal entity capable of transcending the regional issues that had heretofore prevented a more unified approach to flood control. Following significant floods in 1882, 1883 and 1884, great progress was made in improving the level of protection from floods, with the Mississippi River Commission developing a system-wide levee plan, setting uniform levee standards and providing meager funding, and the levee districts providing the labor and most of the funds. This progress

coincided with the rapid economic growth of the Gilded Age in America and the exploitative and extractive attitudes of the New Age of Imperialism in America. This resulted in an almost insatiable quest to exploit the vast raw potential of the “American Congo” in the alluvial valley and establish a modern and prosperous society on land that was once overflowed -- a society with homes, farms and industry capable of building and sustaining a tax base to finance roads, rail lines and ports that would connect the empire with the markets, capital and population centers in the North and along the eastern seaboard. Yet, every time the vision seemed on the verge of fulfillment, the river would once again take it all away and shatter the dream. This happened in 1890, 1897, 1903, 1912, 1913 and again in 1916.

Finally, the third element of the triad – the United States Congress -- stepped in and fully embraced flood control in the valley like never before through the passage of the first federal flood control legislation. Through the Flood Control Act of 1917, Congress officially recognized its partnership with levee districts and the states and authorized \$30 million in federal funds to be matched by \$15 million in local funds over a five-year period for the construction of the levee system. This figure represented a staggering increase in the level of the federal commitment toward flood control given the fact that the federal investment toward levees over the previous 38 years since the establishment of the Mississippi River Commission only aggregated \$32 million.⁴ The keepers of the vision, emboldened by the new level of federal commitment, continued to push their vision for a “New Eden” in America with renewed vigor. The Southern Alluvial Land Association issued a triumphant boast -- “the clarion call of the Alluvial Empire” -- that reflected the lingering indomitable attitudes of the Gilded Age and the Age of New Imperialism:

“Behind a chain of titanic levees that have conquered the Mississippi River, amazingly productive farms have sprung from what before was a cut-over waste; modern towns with comfortable homes, prosperous stores, churches and schools have risen from erstwhile deserted cross-trails; drainage has robbed the mosquito of its lair and is driving malaria from the land; hundreds of millions of dollars are being spent for hard-surfaced highways with concrete bridges – and yet only a bare start has been made toward building the Alluvial Empire.”⁵

Less than a decade later, the valley lay in ruins, the clarion call of the Alluvial Empire seemingly silenced forever by the Great Flood of 1927. Yet from that destruction, hope emerged. The triad of the people, the engineers and the Congress got up, dusted themselves off and went back to work. A little more than a year after the devastating flood, the comprehensive MR&T project was born.

The triad not only established the framework of the MR&T project in 1928, but over successive generations spanning more than 80 years, it also modified the project to make it

more appealing to the people and commerce that it served; expanded the comprehensive nature of the system's flood protection to include reservoirs, channel rectification, interior drainage and backwater levees; and nurtured the project by securing healthy appropriations and authorizations. Such efforts had shaped the MR&T project that performed admirably under extreme pressure in 2011. In the aftermath of that 2011 flood, that same triad, albeit with a new generation of personalities, needed to marshal its forces again to put the system back together.

DAMAGE ASSESSMENTS & PRIORITIZATION

The triad's first step toward restoring the MR&T system involved securing a full engineering understanding of the true magnitude of the damage to various project features. That task fell to the Corps of Engineers and to the levee districts. That either was even in position to begin preparing damage assessments by June 1, so quickly after the flood crest had passed, was a testament to early planning. Even prior to the activation of the Birds Point-New Madrid floodway on May 2, 2011, with the flood still gaining momentum, Walsh and Edward Belk, the chief of programs for the Mississippi Valley Division, had the foresight to discuss the recovery phase that would take place after the system-wide flood fight ended. On the morning of the floodway activation, Belk famously challenged weary flood fighters and decision makers to not lose focus or let their guard down, but to "reload and recock" in preparation to face the challenges that the still burgeoning flood was sure to offer in the weeks ahead.

To prepare for the unknowns that lay ahead, Belk, at Walsh's suggestion, quickly initiated a three-pronged attack consisting of teams organized into various operational phases or "ops" phases: currents ops, future ops and recovery ops. The current ops team focused on the immediate issues to be expected within the next 24-hour time period. The future ops team held the responsibility to stay out ahead of the flood crest and look to identify and gather detailed information on potential "hot spots" that could be expected anywhere from two to seven days



Edward Belk, far right, listens to a briefing with members of the Mississippi River Commission in August 2011 while serving as the chief of Programs.

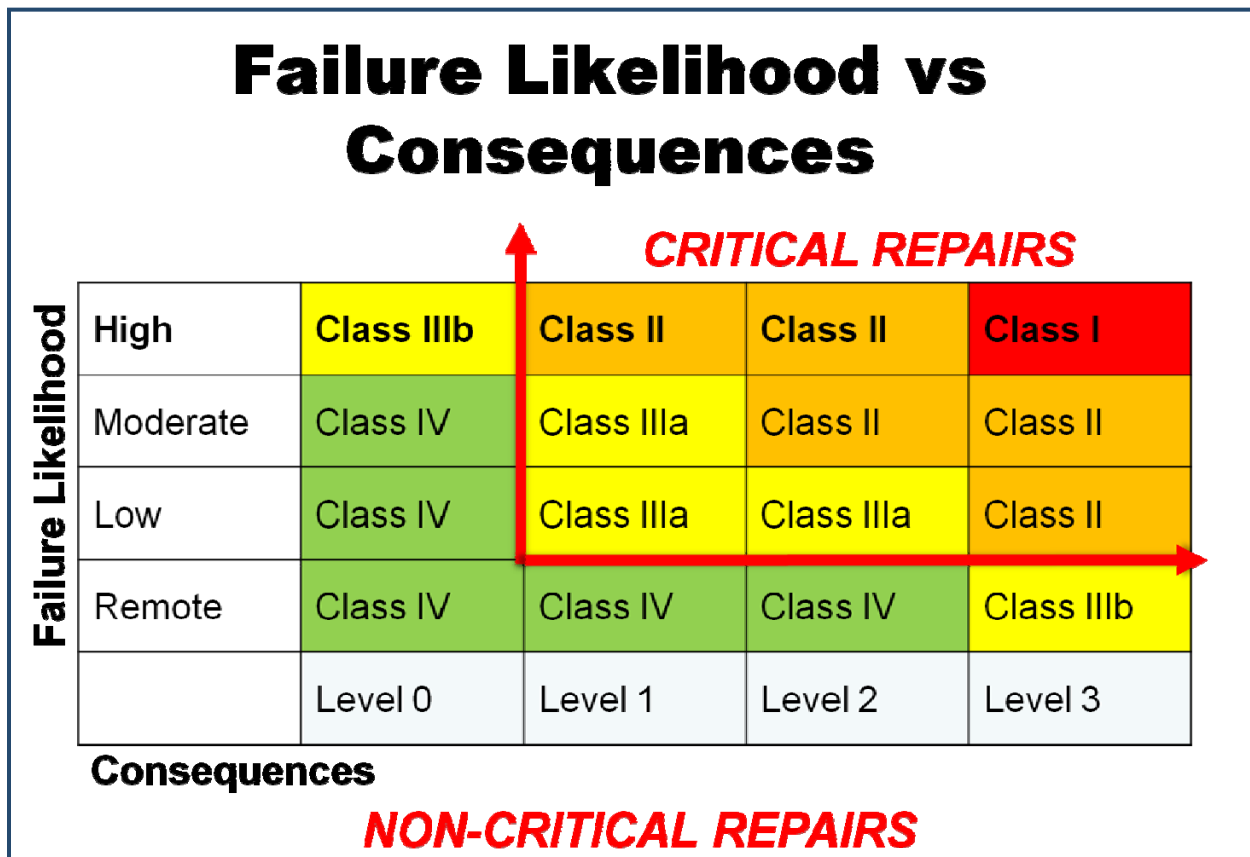
into the future. The recovery ops team would concentrate on gathering resources and support to put the flood control system back together after the flood. By the morning of May 4, Belk had all three ops teams fully operational and participating in the daily briefing with Walsh. To place the synergy among the teams into context, on May 4, the current ops team was focused on the issue of activating the middle crevasse at the Birds Point-New Madrid floodway. The future ops team was gathering data on the Yazoo backwater levee and the potential activation of the Bonnet Carré and Morganza spillways. The recovery ops team was concerned with initial damage assessments to the system at the floodway, Cairo, Illinois, Fulton County, Kentucky, and other levees in the confluence area and considering plans for repairing the system at those locations.⁶

Naturally, the recovery ops team was limited in what it could accomplish so early in the flood fight, but they were able to track hot spots identified by the other two teams and start piecing together rough estimates of damages to this system. During the morning briefing on May 13, Scott Whitney, the recovery team leader, informed Walsh that the team had matured a three-phase blueprint for full restoration of the MR&T system. The first phase, which involved damage assessments, was already underway, though the full extent of the damages would not be fully understood until well after the river returned to its banks. The evaluation phase would also commence after the flood. During the evaluation process, the team would assess the performance of the flood control features in the system and the various decisions and actions made during the flood fight. The repair phase was to be broken down into two subsets: a “reset” phase to provide a basic level of protection before the next flood season and a “restore” phase to return the system to its pre-flood condition. Whitney also reported that the team had developed a preliminary draft assessment spreadsheet that contained a list of 44 levee systems and flood control structures, descriptions and assessment of the damages sustained, preliminary ideas to rehabilitate the structures and a very rough cost estimate for repairs. According to the preliminary damage assessments, the federal government would need to set aside \$700 million to reset the MR&T system and \$2 billion to restore the project to its full level of protection.⁷

To put that amount into perspective, the entire appropriation for the 2011 fiscal year only contained \$264 million for the MR&T project and the president’s proposed budget to Congress for the 2012 fiscal year only suggested \$210 million. Repairs of the magnitude identified by the recovery ops team required an emergency supplemental bill from Congress. Until such emergency funding arrived, the Corps of Engineers needed to finance the most critical repairs from existing funding sources. Possessing the authority to transfer funds from projects into its Flood Control and Coastal Emergency (FCCE) account, the Corps of Engineers headquarters began scrubbing the accounts on projects from around the nation to identify unobligated funds that could be transferred into the FCCE account. Not that all of those funds would find their way to the lower Mississippi Valley. Flooding in 2011 was not limited to the MR&T project.

Severe flooding also occurred along the Missouri River, the lower Ohio and its tributaries, the Arkansas-White basin and the Souris River. Like the MR&T project, the flood control features in those basins had sustained damages as well, and would be competing with the MR&T for the limited repair funds.

During the summer, the Corps of Engineers headquarters in Washington, D.C., issued official guidance for classifying critical repairs to damaged flood control features in hopes of developing a prioritized list from across the nation in order to allocate the limited funding available to the most crucial projects. The Mississippi Valley Division recovery team had already developed its list of 44 projects as part of its initial damage assessment and cost estimate, but the list now had to be refined, broken down further and placed in a “risk matrix” that would classify each individual project or feature. The guidance from headquarters essentially specified that all repairs be placed into the matrix and receive a critical repair classification based on an assessment of the likelihood of failure during a flood having a 25-year frequency and the potential consequences of a failure at any given location. The four categories of “failure likelihood” would be placed on the axis of the risk matrix in descending order from top to bottom to reflect whether the project feature had a high, moderate, low or



Risk Matrix used to classify critical repairs .

remote likelihood of failure. The four levels of “potential consequences” would be placed along the horizontal of the matrix in ascending order from left to right: Level 0 (no significant impact), Level 1 (indirect potential for loss of life), Level 2 (significant potential for loss of life and damage to property) and Level 3 (high potential for loss of life and damage to critical infrastructure).

Only projects that had a high likelihood of failure and a high potential for loss of life and damage to critical infrastructure achieved the highest repair classification of Class I – High Potential for Loss of Life. Class II – Significant Loss of Life and Significant Economic Damage – encompassed those projects judged to have a high likelihood of failure at consequence levels 1 and 2, a moderate likelihood of failure at consequence levels 2 and 3; and a low likelihood of failure at consequence level 3. Class III – High Impact to Navigation or Indirect Potential for Loss of Life – was reserved for projects with a moderate to low likelihood of failure, but with consequence levels 1 or 2. Any projects falling outside of these parameters fell into either Class IIIb or Class IV, which meant that they represented non-critical repairs.⁸

Classifying the repair items, for the most part, was a fairly cut-and-dried process. During the process, the recovery team broke the original 44 items from the initial damage assessment into 93 separate repair items, including 32 levee or floodwall projects, 22 channel improvement projects, 14 repairs to structures (control structures, dams, spillways, pumping stations) and 25 dredging projects. Of the 93 projects on the list, 12 met Class I criteria and another 43 met Class II criteria. The remaining 38 projects met Class III criteria. The aggregate estimated cost for the repairs came to \$778 million, with the Class I repairs amounting to \$84.5 million, the Class II repairs amounting to \$548.8 million and the Class III repairs counting for the remaining \$144.7 million.⁹

The most difficult part of the process involved prioritizing the 93 projects. The prioritization effort involved engineering and operations leaders from across the flooded Corps of Engineers districts within the Mississippi Valley Division. Naturally, evaluators from different regions strongly believed that the projects in their home districts warranted the highest placement on the list. And then there was the question of what to do with the Birds Point-New Madrid floodway; it proved just as controversial, if not more so, after its activation than during the actual opening of the floodway itself. In the same way the activation of three intentional crevasses in the frontline levee at the floodway defined the 2011 flood, the post-flood treatment of the crevasse sites defined the recovery process, especially with respect to emergency funding, throughout the summer and fall of 2011. The post-flood treatment of the floodway also tested the long-tethered bonds of partnership among the various components of Grugett’s triad, straining their relationships to an extent not witnessed since the early “battle over the floodways” in the 1930s.¹⁰

ANGST IN THE FLOODWAY

The post-activation phase of the controversy commenced innocently enough in mid-May of 2011 when Maj. Gen. Walsh assured Congresswoman Jo Ann Emerson, whose district encompassed the floodway, that he intended “to make things right” in terms of restoring the frontline levee. A few weeks later, with the Mississippi River still flowing into the floodway through the intentional crevasses, Col. Reichling, the Memphis Engineer District commander, announced that his engineers were developing plans to have a temporary levee in place by March 1, 2012, at the very latest.¹¹

The announcement further angered floodway landowners, who were already agitated over what they perceived as an absence of a post-activation plan for the floodway. Armed with the knowledge that in the aftermath of the 1937 activation of the floodway, the Corps of Engineers had a temporary levee in place within ninety days of the explosive detonation, they demanded that the federal government fully restore the levee during the summer of 2011. To place their reaction to the announcement into proper context, it is important to understand that the landowners were still seething over Walsh’s decision to activate the floodway. They chafed at statements by Walsh and other leaders from the Corps of Engineers that the floodway activation



Colonel Vernie Reichling greets Thomas W. Schulte, the district office director for U.S. senator Roy Blunt, at the Birds Point-New Madrid Floodway in mid-May, 2011.

represented a success and that the MR&T system performed as designed. The system as a whole may have performed as designed, but the landowners insisted that the same could not be said of the floodway. The floodway certainly prevented higher stages and further stress on surrounding levees in the region, but in the landowners' view none of the activations at the three crevasse sites were executed in accordance with the operations plan. Only 9,000 out of the planned 11,000 linear feet at the upper crevasse site were opened up due to timing constraints and equipment problems. This reduced the amount of inflow into the floodway from the designed 550,000 cfs to 400,000 cfs. The lower crevasse also underwent partial activation as only five of the six access wells were filled before the crew believed it ran out of liquid blasting agent. Walsh ordered the floodway task force to secure and use an alternate explosive at the middle crevasse, but it was not as effective as the original explosive and only partially opened the levee. One landowner, Milus Wallace, likened the Corps of Engineers' claims of success to a student taking and grading a test that the student created, "if he writes the test, if he takes the test, and if he grades the test, I bet he's going to get a good grade."¹²

Reichling's announcement also drew a rebuke in the form of a letter signed by Roy Blunt and Claire McCaskill, Missouri's two senators, and by Emerson. In the letter, the Missouri congressional delegation stressed that the prospect of leaving the floodway unprotected for nearly a year was "simply not acceptable" and needed to be "addressed immediately."¹³ In fairness to Reichling, though, it must be noted that, absent the waiving of nationally mandated environmental requirements and the passage of an emergency supplemental bill by Congress, it was doubtful that the Memphis Engineer District could fully restore the levee by the end of summer. As it was, Reichling intended on getting the project started and making as much progress as possible with the meager funds made available to him.

One day later, on May 25, Reichling met with the Mississippi River Commission and discussed possible paths forward to restore the frontline levee at the floodway. Reichling informed the commission that his immediate priority was to reset the three crevassed sections to an elevation equivalent to 55 feet on the Cairo gage by March 1, 2012, in time for the next growing season. The selected height represented the original authorized height of the frontline levee as established through the 1928 Flood Control Act. Reichling had yet to develop a timeline for fully rebuilding the levee to its pre-flood height of 62.5 feet because full restoration depended on the condition of other flood control features in the confluence area. The floodwalls and levees at Cairo and Fulton County had long been considered weak links in the system. The 2011 flood only served to further weaken those weak links. As such, Reichling wanted to determine if the areas behind the weakened structures faced greater risk in the event another flood of similar magnitude struck again. Reconstructing the frontline levee above the proposed interim level would necessarily raise flood stages and place more pressure on those weak links in the confluence area.¹⁴

During what Belk described as “lively discussion” among the commissioners, Walsh indicated that he would not commit to rebuilding the frontline levee at all until he had a better feel for other priorities in the system, particularly at Cairo and Fulton County. He also wanted to wait until he had a clear understanding of what Congress intended to do in terms of funding. With this in mind, Walsh told Reichling that any timeline for constructing the frontline levee must be based on funding rather than specific dates. Walsh also instructed Reichling to redefine the “reset” of the levee as “restoration to full grade and section” rather than a lower interim level. In other words, Walsh initially intended to bring the levee all the way up to final grade or do nothing at all until he and the engineer team were certain of the condition of nearby levees elsewhere in the confluence area. As the president of the Mississippi River Commission, Walsh was obliged to think of the system as a whole. Congress established the commission for that very purpose – to serve as an agent capable of transcending regional entanglements. To this end, Walsh necessarily settled on a system rebuild approach with the intent of not exposing any single area to a higher risk of flooding during the recovery and reconstruction phases.¹⁵

On June 6, Walsh sent a formal memorandum instructing Reichling and the Memphis Engineer District to develop, within seven days, a plan and cost estimate to stabilize the crevassed sections of the frontline levee. The plan was to only focus on providing a stable platform for future construction. The plan was not to include any movement toward the redefined reset phase. To that end, the commission president instructed Reichling to develop a draft reset plan within 30 days. Walsh indicated his desire for the plan to take into account his earlier guidance as to the definition of “reset” and the condition of the levees and floodwalls at other locations in the confluence area. He also reiterated his instruction that the timeline be dependent on the availability of funding.¹⁶

Members of the levee districts responsible for the floodway and floodway landowners understood perfectly what Walsh’s directives meant—the work to rebuild their levee would not commence until the completion of the damage assessments for repairs in the system. This would not occur until late September, toward the end of the harvest season. Floodway farmers still held hope of planting and harvesting a crop during the 2011 growing season, but doing so without levee protection represented a significant risk of further financial losses on top of the losses they already incurred to help relieve pressure elsewhere in the system. Furthermore, construction would only begin if Congress delivered some sort of emergency funding. This was a big if considering the fiscal climate in Washington, D.C.

The locals were understandably impatient and deeply frustrated. Their plight leading up to the flood had gone largely ignored by all media but the local outlets, as news coverage of the Tuscaloosa tornado of April 27, the royal wedding in Great Britain and the death of Osama bin Laden overshadowed what took place in the floodway almost up until the point of activation.

As landowners watched the Mississippi River course over their lands and destroy what property and belongings they could not retrieve, some environmentalists, conservationists and flood plain restoration advocates launched a campaign of guest editorials, letters to the editor and broadcast media interviews suggesting that it was time to rethink the rebuilding of the levee system and convert the lands behind the levees into wetlands.¹⁷

Leary of such talk and hoping to get the process of rebuilding the frontline levee into motion, the local levee districts developed engineering plans and specifications to provide interim protection constructed at local expense. Under the plan, the levee districts would rebuild the levee to an interim grade of 51 feet on the Cairo gage. They preferred going to a higher grade, but the proposed grade represented all that they could afford to fund. Prior to sending the plans to the Memphis Engineer District, the local stakeholders secured support of the plan from Missouri Governor Jay Nixon. Nixon sent a letter to Walsh indicating that the state of Missouri backed the plan and stood ready to commit the necessary resources to complete a temporary levee – a move resisted by Walsh. Citing the need for floodway farmers to have “an adequate level of safety to be able to proceed with planting,” Nixon pointed out that the plan represented a “critical initial step” to begin the area’s recovery.¹⁸

In mid-June, Reichling submitted a series of alternative plans to stabilize the individual crevasse sites to an elevation corresponding to 46 feet on the Cairo gage, or two feet above natural ground level. In keeping with Walsh’s instructions from the May 25 briefing, Reichling pointed out that the proposed elevation would not create undue risk on the other levee systems



Members of the Mississippi River Commission and their technical staff, along with the Memphis Engineer District leadership team, receive an update on the levees along the confluence area.

in the confluence area. A quick examination of records by the Memphis Engineer District indicated that the other systems did not experience underseepage below a stage corresponding to 51 feet on the Cairo gage, which was ironically the same level of protection posed by the levee district. Reichling also commented on the plan for interim protection, indicating that it could be incorporated into the overall reset plan and result in significant savings to the government. Reichling stopped short of giving his outright endorsement of the plan, noting that he had advised the state that approval rested with Walsh.¹⁹

The following day, June 15, the House Appropriations panel considering a bill for water projects provided some initial clarity on its intentions by announcing its approval of \$1 billion in emergency funds to repair damaged flood control projects and to clear debris from the river to keep it open for commerce. In a move that seemed to offer promise of compromise to satisfy congressional members concerned about further deficits, the panel indicated its intention to offset the emergency appropriation by rescinding unobligated stimulus funding set aside for high-speed rail projects. Although the announcement was only the first step in what was sure to be a lengthy emergency supplemental funding process, the news undoubtedly reassured Walsh. He had been under intense pressure from Nixon, Emerson and the two Missouri senators – Blunt and McCaskill – to restore the frontline levee. He also most likely received pressure from Maj. Gen. Bo Temple, the acting Chief of Engineers, who only a week before had toured the floodway and met with angry stakeholders. That same day, Walsh approved Reichling’s recommendations, with one exception – the crevasse sites were to be based on a target elevation of 51 feet on the Cairo gage instead of the proposed 46 feet. Walsh made no mention of the state’s offer of financial resources.²⁰

The decision to target the elevation of 51 feet initially eased some concerns within the floodway, but the goodwill it generated by the thought of earth moving equipment working and diesel fuel burning quickly eroded. The Memphis Engineer District mobilized to begin repairing the crevasse sites on June 16, but “Operation Make-Safe,” as the project came to be known, almost immediately ran into delays brought on by unavoidable circumstances. First, the discovery of residual blasting agent limited construction activities at the upper crevasse site. Then in early July, biologists discovered the presence of the endangered Least Tern on a sandbar at the middle crevasse site. The discovery forced the district to suspend all work at that location pending the completion of an Environmental Assessment. Eight weeks later, the endangered bird departed from its nesting area, which allowed work to resume on a limited basis pending the completion of an environmental assessment. The delays, along with the perceived absence of a post-activation plan, truly tested the relationship between the levee districts and the Corps of Engineers. That relationship had already been showing signs of strain, not just in the floodway but throughout the MR&T footprint, over new levee safety standards and levee certification criteria being championed by the Corps of Engineers since the

devastation in New Orleans caused by Hurricanes Katrina and Rita. During the hot summer months of 2011, though, the floodway served as the focal point of the rift.²¹

Meanwhile as the summer dragged on, Walsh continued his system rebuild approach bent on restoring the levee system in the confluence area in parallel fashion, much to the growing dissatisfaction of floodway landowners and their elected officials. He wanted to fix the underseepage at the “weak links” at Cairo and Fulton County before he consented to building the frontline levee to full height. Walsh’s logic, to be certain, was sound from an engineering standpoint. In July, an engineering analysis conducted by the Memphis Engineer District recommended giving the levees at Cairo and Fulton County a higher priority than the full restoration of the frontline levee.²² Walsh’s system approach also had strong support from private engineers, politicians and landowners from the states across the river – themselves members of the triad with their own concerns. It is also possible that Walsh was hiding behind that logic in an attempt to heighten pressure on Emerson, a member of the House Appropriation committee, to secure funding for all system repairs, and not just the floodway.

It was no secret that Walsh was surprised, perhaps disappointed, that Congress did not pass an immediate emergency supplemental bill. The June 15 approval of \$1 billion for repairs by the House Appropriations panel seemed to be losing impetus after the Senate panel did not reciprocate. Even if the full House and Senate approved the Energy and Water Appropriation bill, the funds would not become available until the beginning of the new fiscal year October 1. The budget climate in Washington, however, did not favor action and Congress made no advancement toward passing an emergency supplemental. Yet, the sacrifice made by floodway landowners during the flood certainly generated strong sympathy and energy for a quick restoration of the frontline levee. Emerson, too, desperately wanted to help her constituents.



The crowded hearing room on the motor vessel *MISSISSIPPI* at the commencement of the New Madrid public meeting on August 15, 2011.

The combination of the visibility provided by the floodway and Emerson's key role as an appropriator presented an opportunity. If Emerson, or the state for that matter, solved the problem at the floodway without addressing the entire system's needs, the real possibility existed that no emergency supplemental would be forthcoming. In light of this, Walsh may have believed that he had no other choice but to try and leverage everything he could to apply pressure on Emerson to assist him in securing the necessary appropriations to repair the entire system. Tying the fate of the frontline levee to levee repairs elsewhere in the system might help assure that and would also serve as one possible explanation for Walsh's resistance to the state's offer of funds.²³

Emerson, though, was doing all that she could. In mid July, George Grugett, of the Mississippi Valley Flood Control Association, along with Mississippi River Commission members Sam Angel and R.D. James, travelled to Washington, D.C., to meet with the congresswoman and other congressional members from the seven states bordering the MR&T project. Emerson used her influence to arrange a brief meeting in a hallway of the Rayburn House Office Building with Hal Rodgers, Chairman of the House Committee on Appropriations. The meeting allowed the commission members and Grugett to personally reinforce to the top appropriator in the House of the post-haste need to repair the damages sustained during the flood. Emerson was not alone in her fight to secure funding for the repairs. The same day of the hallway meeting, Congressmen Mike Ross and Rick Crawford of Arkansas, Ed Whitfield of Kentucky and Jerry Costello of Illinois, issued a letter to Chairman Rodgers and Norm Dicks, the ranking member on the committee, requesting an appropriation to reset and restore the MR&T system. Senators from within the MR&T footprint followed suit, with Mississippi Senator Roger Wicker and Louisiana Senator Mary Landrieu writing letters to the leadership of the Senate Committee on Appropriations requesting an emergency supplemental bill. Again, though, the fiscal atmosphere in Washington proved too tough a nut to crack. The climate simply was not conducive for securing an emergency supplemental, despite Emerson's unrelenting determination.²⁴

The tension among the triad and the feud over the fate of the frontline levee at the floodway reached a crescendo during the hot, sticky days of August. As part of its annual low-water inspection trip, the Mississippi River Commission held a public meeting on the motor vessel *MISSISSIPPI* while docked at New Madrid. All parties involved were present. Approximately 150 members of the public crammed into the crowded hearing room, along with at least another 30 Corps of Engineers personnel to hear 29 speakers provide testimony to the commission. In many ways, the meeting carried the same uneasy tension as the April 27, 2011, public meeting in East Prairie, Missouri, prior to the activation of the floodway. The major difference was that this time the people in the room were not merely under the threat of a potential floodway operation, but they were living through the aftermath of the fateful, but



Congresswoman Jo Ann Emerson (MO-8) addresses the Mississippi River Commission during the public hearing at New Madrid on August 15, 2011.

necessary, decision. Now they had a clear target in sight for their angst – Maj. Gen. Michael Walsh.

Congresswoman Emerson led off the by expressing her frustration with “the lack of commitment to fully rebuild” the frontline levee. She also called “ludicrous” the effort to prepare an environmental assessment on a levee that already existed. After informing the commission that she was working tirelessly to secure emergency funding for the repairs, she placed part of the responsibility for funding repairs back on the Corps of Engineers by pointing out that the agency had five billion dollars in unobligated funds that needed to be “repurposed to deal with the most egregious needs in the MR&T.” To hammer the point home, she emphasized that none of her congressional counterparts would dole out taxpayers funds to the Corps of Engineers to repair the damaged flood control system if the agency “will not build levees with the money it already has.” Senator Blunt, testifying via videotape, followed Emerson’s testimony. He expressed concern about the pace of progress in restoring the levees, stating that “51 feet of protection is not good enough.” He urged the commission to “take all necessary steps” to rebuild the frontline levee “without delay.”²⁵

The testimony continued for five long hours in the cramped, stuffy hearing room. Much of it ranged from passionate pleas for immediate restoration of the frontline levee, to various proposals for alternative plans for activation through natural overtopping, to unfortunate ad hominem attacks on the Corps of Engineers and Walsh, in particular. There were a few presenters from Illinois, Kentucky and Tennessee, however, who braved a handful of protesters outside the motor vessel. Despite the mostly bitter crowd in the hearing room, they expressed

their thanks to Walsh for making the tough decision to activate the floodway while sharing their sympathy for the sacrifices made “on the other side of the river.”

One presenter, representing one of the local levee boards responsible for the floodway, complained of the ever-changing direction emanating from the Corps of Engineers. First he cited the original message that the levee would be restored by March 2012, then the switch to a temporary levee that would only provide interim protection to 51 feet on the Cairo gage and then the latest plan to not restore the levee until “the rest of the system” was restored. Indicating that the levee board “could probably stomach” the first two messages, he described the latest plan as “unacceptable” as there was no timeframe, no money and no real definition for “the rest of the system.” Another presenter, in reference to the ongoing environmental assessments for the levee reconstruction and the endangered Least Tern, indicated that area residents had taken to referring to the agency as the “Corps of Environmentalists.” Yet another presenter, invoking Walsh’s earlier promise “to make things right,” proclaimed, “General Walsh, you welched!” Yet, it was the mayor of nearby East Prairie, who provided the most compelling. Mainord sought to put a very human face on the floodway operation and how it “changed our way of life forever.” Mainord relayed real life personal accounts of the mental, emotional and financial anguish that his friends, his neighbors and his employees experienced after losing their jobs, their homes and their irreplaceable memories. He ended passionate testimony with a “plain and simple” demand to “build our levee back to the original height.”²⁶

The public meeting at New Madrid certainly highlighted the division among the elements of the triad, but later that day the schism spread to the Mississippi River Commission itself. Following the long and heated public hearing, Dennis Norris, chief of operations for the division office, presented a draft version of the “priorities list” of the 93 critical repair projects to the commission for its ultimate approval before sending it to the Corps of Engineers headquarters. Sure enough, the Birds Point-New Madrid floodway ranked as the highest priority on the list.

This lofty ranking, though, came with a caveat. The recovery ops team divided the floodway into the two phases of construction envisioned by Walsh: Operation Make-Safe, which involved filling the scour holes at the crevasse sites and providing an interim level of protection to 51 feet on the Cairo gage, and Operation Restore, which would eventually rebuild the frontline levee to its pre-flood condition. Operation Make-Safe represented the top priority on the critical repair list. Operation Restore fell all the way down to number 28, one place behind the levee repairs at Fulton County, Kentucky, a traditional trouble spot plagued by underseepage that had long gone untreated over the inability of the levee district to secure necessary rights-of-way. Therefore, in order to fund all critical repairs on the list down to and including Operation Restore, the Corps of Engineers needed to secure at least \$230 million in either repurposed funds from other projects or through additional congressional appropriations

and solve longstanding property issues. As of mid-August, the Corps of Engineers headquarters had yet to reprogram enough funds from other Corps of Engineers' projects to finance past the first six critical repairs on the list and there were still no signs of an emergency supplemental forthcoming from Congress. The same could be said of Emerson. If she wanted to secure funding for the full restoration of the Birds Point-New Madrid floodway frontline levee, she would need to cajole Congress into appropriating enough emergency funds to buy the list that far down.

Several sessions of intense discussion followed among the commission and its staff. Most of it centered on the placement of Operation Restore on the list. One school of thought held that the complete restoration of the frontline levee to its pre-flood status should be the highest priority on the list. After all, the commission intentionally crevassed the levee and inundated the floodway to relieve pressure on the system. Granted, Walsh gave the order according to the law and to the approved operations plan, but the passionate testimony heard at New Madrid had left some members of the commission conflicted. Others present in the meeting, while expressing sympathy for the plight of floodway landowners, explained that the prioritization criteria handed down by the Corps of Engineers headquarters only took into account life safety and property damage factors. Since the floodway was already damaged by the operation and there were no lives currently at stake, other areas that were in much worse shape and faced extreme



The Mississippi River Commission and technical staff discuss the priorities list ranking the MR&T critical repair projects on August 15, 2011. Seated from left to right: Edward Belk, William Clifford Smith, George Grugett, Sam Angel, Maj. Gen. Michael Walsh, Brig. Gen. John McMahon, R.D. James, Maj. Gen. John Peabody, and Stephen Gambrell. Standing: Dennis Norris and Robert Fitzgerald.

danger to life and property in the event of another flood warranted a higher priority placement than the restoration of the frontline levee to its pre-flood status.

A compromise was in the making. Commission member Maj. Gen. John Peabody, moved by Mayor Mainord's passionate testimony during the public hearing, expressed concern over limiting the Operation Make-Safe protection level to 51 feet on the Cairo gage because it corresponded to such a low level of protection. Over the preceding 25 years, the river exceeded the stage of 51 feet at Cairo 14 times, meaning that chances were greater than 50 percent that the river might overtop the Operation Make-Safe effort when completed. Peabody requested more data on the consequences for the weak links in the region if the commission approved an interim level of protection at the floodway higher than 51 feet.²⁷

Robert Fitzgerald, chief of engineering for the commission, indicated that the Memphis engineers based the Make-Safe elevation of 51 feet on a conservative estimate without the benefit of full analysis because of time constraints and because the full extent of the damages at Cairo, Fulton County and other confluence area systems was still unknown at that time. Based on their refined understanding of system conditions, those same engineers were now confident that the levee could go higher without adding too much risk to the system, possibly as high as 55 feet on the Cairo gage. The commission agreed to allow the staff to conduct a thorough engineering analysis and present a formal recommendation prior to November 30, when Operation Make-Safe was scheduled to reach 51 feet. The prospect of raising the level of protection assuaged the commission's concerns about the ranking of Operation Restore. On August 25, Walsh forwarded the recommended priority list to the Corps of Engineers headquarters. Now everything depended on finding the money to put the system back together.

FUNDING THE REPAIRS

Though still somewhat distrustful of the situation, floodway landowners and their levee district representatives were at least inwardly delighted by the prospect of receiving protection to 55 feet by the next flood season. Granted, they still preferred full restoration and, if possible, a commitment from the Mississippi River Commission to explore new methods of activation that did not involve intentionally crevassing the frontline levee with explosives; but as the summer turned to fall the relationship between the locals and the Corps of Engineers had improved significantly. One reason for the improvement rested with the fact the farmers were able to get a crop in the fields at most locations in the floodway. By all indications that crop was shaping up to produce a decent yield. Second, the Memphis Engineer District made a strong public relations push to keep the public informed of progress, including the release of status reports every three days starting in August of 2011 and the establishment of a field office in East Prairie to handle claims for losses and answer questions. Along with the flurry of

construction activity and the promise of greater protection, these factors served to quell some of the most overt criticism of Walsh and other leaders from the Corps of Engineers.

Moreover, funds from the Corps of Engineers' self-financing effort were beginning to trickle in, which meant that contracts could be awarded for repairs at other locations in the lower valley. The Corps of Engineers higher headquarters had transferred approximately \$212 million in funds revoked from various studies and projects into the FCCE account to address emergency repairs necessitated by flooding and hurricanes across the Midwest and the South. More than \$75 million of that amount had already been earmarked for the MR&T system. In fact, the month of September saw significant movement toward restoring that system. By the end of the month, sixteen contracts had been awarded for items on the priority repair list, including nine of the twelve Class I projects that contained a high potential for loss of life.²⁸

The Class I projects were scattered throughout the valley. After Operation Make-Safe, the next five priority items on the list involved projects in the immediate vicinity of Cairo, where nearly six thousand residents and \$73 million in infrastructure were considered at high risk from another flood. Of these five repairs, the Cache-Cairo revetment ranked the highest. The revetment protects the riverbank just below the Cairo floodwall for almost the entire length of the city on the Ohio River. During the 2011 flood, the revetment experienced severe scour that compromised the integrity of the revetment and steepened the slope of the bank to unsafe levels. The intended repair consisted of a stone blanket constructed to provide bank stability and covered by a new layer of articulated concrete mattress. The third ranked priority repair



Col. Jeffrey Eckstein, Commander of the Vicksburg Engineer District, inspects the permanent repairs at Buck Chute.

View of the Sheep Ridge Road Spur Levee at Merriwhether-Cherokee in October 2010, prior to the attempted natural river cutoff.



The river attempts to carve a new channel at the same location May 4, 2011.





Riverbank restoration at Merriwhether-Cherokee on May 22, 2012.



A view of the riprap cap placed over the dredge fill material placed once the bank had been reestablished.

involved the famed Cairo “mega boils” where Chip Newman and his crew fought to control severe underseepage with massive sand boil rings. Here the plan to remediate involved a combination of relief wells, landside seepage berms, a slurry trench and drainage measures. The same treatment was proposed to control the seepage at the next priority site, known as Cairo Parcel 5, where hundreds of medium-to-large boils materialized near the Ohio River levee to the north of Cairo. The repair items ranking at fifth and sixth on the priority list also sought to address excessive underseepage. Known as Cairo Parcel 2A Relief Wells and Cairo Parcel 2 Slurry Trench, these projects sought to alleviate damages caused by excessive hydraulic pressure at the base of the Mississippi River levee to the north of Cairo.²⁹

After the Cairo projects, the next two priority projects were located in the Vicksburg Engineer District. The Mississippi River levee at Buck Chute ranked seventh on the priority list. Located in the Yazoo basin, Buck Chute was the site of the dramatic race against the rising river to construct an earthen berm over an area at the landside base of the levee beset with severe underseepage. Once the berm was completed, Vicksburg Engineer District water control managers raised the water levels at Eagle Lake to create a water blanket over the earthen berm in order to counteract pressure from the river. The proposed repair at Buck Chute required the removal of the emergency repairs and installing a combination of relief wells, a seepage berm and horizontal drains to permanently correct the problem. The Albemarle Slide, located a short distance to the north of Buck Chute, ranked eighth on the list. This site, too, involved one of the more compelling emergency repairs during the flood fight. The repair project consisted of the construction of an earthen berm to provide slope stability.

The remaining Class I priority repairs were located in the New Orleans Engineer District. The Mississippi River levees at Duncan Point and the Baton Rouge Front both represented significant risks to a population of more than 440,000 and more than \$37 billion in infrastructure. At Duncan Point, the recovery ops team recommended the construction of a seepage berm to address the underseepage. The Baton Rouge Front repair necessitated the placement of a rock berm on the riverside toe of the levee to provided added stability. Ranked eleventh on the list was the Third District revetment at downtown New Orleans, an area long-threatened by scour that placed more than 340,000 people and \$29 billion in household structures at risk in the event of failure. The recovery ops team recommended placement of a stone blanket to prevent further scour and the construction of a stone berm to stabilize the bank just below the floodwall. The final Class I priority involved placing piezometers and relief wells at the Morganza spillway to combat excessive underseepage at that key component that protects Baton Rouge and New Orleans.

Beyond those projects, all that ranked above the Operation Restore at the Birds Point-New Madrid floodway were fifteen Class II projects that posed a significant potential for loss of life and significant economic damage. Once the Corps of Engineers could “buy down” these Class

II projects and the Class I repairs, work could commence on Operation Restore. The Class II projects included six channel improvement repairs, and levee repairs at Francis, Winterville, Rena Lara, Fulton County and elsewhere in the system. Two of the channel improvement projects near Memphis – the Merriwether-Cherokee revetment and the Presidents Island revetment – held a high likelihood of failure without corrective action in the event of another flood.

At both locations, if the 2011 flood had continued for a longer period of time, the river would have successfully established new channels that would have resulted in serious impacts to navigation, especially during any periods of low water. More significant, however, were the potential channel shifts that would have posed serious scour threats to nearby Mississippi River levees. The revetment performed admirably at both locations by preventing cutoffs, but on the backside the river scoured out massive holes that needed to be filled with dredged material and capped by clay after the top banks were reestablished. To lend perspective to the magnitude of the scour at Merriwether-Cherokee, the river eroded away roughly 8 million cubic yards of earth and created a hole 80-feet deep, 4,000-feet long and 2,700-feet wide.

As for Operation Make-Safe at the Birds Point-New Madrid floodway, the Memphis Engineer District completed operations to 51 feet at the lower crevasse site on October 9. Work to provide protection to that same level at the upper crevasse was 83 percent complete and three



The extent of temporary repairs on the upper crevasse site at the Birds Point-New Madrid Floodway in late October 2012..



The extent of temporary repairs on the upper crevasse site at the Birds Point-New Madrid Floodway in late October 2012.

weeks ahead of schedule for its anticipated November 16 completion date. Work at the middle crevasse, despite the lengthy delay over the Least Tern issue, was also on schedule for its November 30 target date.³⁰ Col. Reichling's engineers also completed their full analysis of the confluence region. They determined that proceeding to a level of protection to 55 feet on the Cairo gage from 51 feet only minimally increased the level of risk to Cairo and Fulton County, but deemed that risk extremely manageable.

The systems at Cairo and Fulton County soon would be on the path to full restoration as the Mississippi Valley Division had received nearly \$76 million in self-financing funds from headquarters. Contracts had already been awarded for the Cairo Parcel 2A Relief Wells project and the Cairo Parcel 2 Slurry Trench project. Designs for the City of Cairo and Cairo Parcel 5 repairs were already being prepared and work expected to begin within a year. There was even good news regarding the Fulton County repairs, which came to be known as the Island 8 project that ranked just above the Operation Restore on the priority list. The president's proposed budget to Congress, while still not enacted, contained \$4 million for Fulton County/Island 8 repairs. On top of that, David Weatherly of the Fulton County Levee Board expressed complete confidence that he could secure the long-elusive rights-of-way by April 2012, with construction able to commence two months later. Based on the analysis provided by his engineers, Reichling

recommended to the commission a plan to continue constructing the frontline levee to correspond to a level of 55 feet on the Cairo gage or, if necessary, use HESCO basket to provide interim protection to that same level. Also, having in mind the progress at Cairo and Fulton County, he requested permission to proceed with developing engineering plans and specifications for restoring the levees to its full pre-flood height. On October 19, Walsh consented to Reichling's recommendations pending the receipt of necessary funding.³¹

Funding continued to be the main obstacle to full restoration of the frontline levee at the floodway, though the self-financing effort bought some time for Congress to act. The fiscal year had ended without the passage of Energy and Water Appropriation bill or even some semblance of an emergency supplemental, but things were trending in the right direction. In mid-September, the Mississippi Valley Flood Control Association, leaders from the levee and drainage districts from the lower valley and members of the Mississippi River Commission travelled to Washington, D. C., to visit with members of Congress and convince them of the compelling need for emergency funds to repair the MR&T system. On the final day of their visit, the Senate approved a \$7 billion plan to replenish federal disaster aid accounts, including more than \$1 billion for the Corps of Engineers for flood control repairs and dredging. The competing plan passed in the House also called for more than \$1 billion for the Corps of Engineers. Though seemingly close to agreement, issues such as cost offsets and aggregate spending needed to be resolved through conferencing, which could drag on for months. There had been a glimmer of hope for something in the interim, as a version of possible continuing resolution to keep the government operating contained \$226 million in emergency repair funds for the Corps of Engineers. While the amount was well short of the needed \$778 million to complete all 93 critical repairs on the list, it would serve as a great start, especially when added to the self-financing money. The \$226 million, however, got stripped from the continuing resolution at the last moment over a conflict of whether or not the amount would be offset by cost reductions elsewhere in the budget. To make matter worse, the Mississippi Valley Division recovery team identified an additional 44 repairs – mostly Class II and Class III – at an estimated cost of an additional \$120 million.³²

As Emerson and other congressional members from the MR&T footprint continued their unrelenting push for emergency funding for repairs, a significant development took place in the valley. On November 10, Maj. Gen. Peabody replaced Maj. Gen. Walsh as president of the Mississippi River Commission and the commander of the Mississippi Valley Division. While Walsh carried the baggage of having ordered the operation of the floodways and other necessary but unpopular decisions during the flood fight and the recovery process, Peabody arrived untainted within the valley. He came with a reputation as being the man who boldly held back as much water as possible behind the dams in the Ohio drainage basin in an effort to prevent activation of the floodway and as an officer adept at getting his projects in the Ohio

basin funded. Perhaps more importantly, Peabody demonstrated a connection with many long-time flood control partners on a personal level. During his first session as a member of the commission in 2008, the heartfelt testimony provided by Rob Rash, the chief engineer of the St. Francis Levee District of Arkansas, moved Peabody to publicly share his own personal story of how he witnessed “the awesome power of floods.” When he was a child growing up in Norwalk, Ohio, a massive storm overwhelmed a reservoir in town and broke through the dam, flooding a large area of town, including his father’s place of business. Peabody was in the theatre in downtown Norwalk watching *Gone with the Wind*, when he and all the other moviegoers were forced to leave the establishment. When he finally made it home that evening, Peabody confronted the reality that the flood had impacted his father’s business and would keep him from earning an income for some time. They had no flood insurance and the family was devastated.³³

As is often the case after a change in leadership, Peabody’s emergence seemed to breathe new life into the dynamics of the flood recovery process, through his personal connection with the people and his tendency for action. Sheer timing helped as well. Almost immediately after Peabody assumed command, the Corps of Engineers provided additional self-financing funds to the Mississippi Valley Division, bringing the total to \$170 million, with \$149 million of that amount targeting critical repairs in the MR&T system.³⁴ These funds bankrolled construction at



Maj. Gen. John W. Peabody meets with floodway landowners in Charleston, Missouri, on December 15, 2011.

various levels for all twelve Class I critical repairs in the MR&T project list, as well as the repairs at the Merriwether-Cherokee and Presidents Island revetments and four additional channel improvement repairs ranked ahead of Operation Restore. Thus, through the self-financing effort, the Corps of Engineers was slowly buying its way down the priority list toward Operation Restore. On December 13, the Memphis Engineer District completed temporary repairs to raise the level of protection at the upper crevasse site to 55 feet on the Cairo gage. On December 15, Peabody travelled to the Birds Point-New Madrid floodway to inspect the HESCO barriers. Afterwards he personally engaged with floodway landowners to hear and address their concerns. Peabody seemed to sense the need and timing of his role as builder, not just for flood control infrastructure, but also a builder of relationships with the people. He immediately took ownership of their problems and provided answers to their questions. As such, his visit was well received by floodway landowners. Milus Wallace, a landowner and staunch critic of the Corps of Engineers since the floodway operation, even happily commented, “I think I’m gonna like him.”³⁵

The day after that meeting, Emerson and her colleagues in the House of Representatives passed bill 3672 authorizing \$802 million for emergency repairs for the MR&T system. The Senate followed suit a day later. Then on December 23, 2011, President Barack Obama signed Disaster Relief Appropriation Act. As it had so many times in the past, the current version of the triad – the Congress, the Corps of Engineers and the people of the valley – had succeeded in assuring the survival and viability of the MR&T project. The various components clashed, demonstrating that the relationship among the triad is not as cozy as some might think, but in the end they achieved the objective. The Disaster Relief Appropriation Act not only provided \$802 million in supplemental funding for the MR&T project, but it also contributed \$153 million in operations and maintenance funds for dredging throughout Mississippi valley and an additional \$35 million in FCCE funds for non-MR&T project repairs. Those funds, together with the \$170 million in self-financing, totaled \$1.2 billion for the engineer districts of the Mississippi Valley Division to restore critical protection to the productive valley.

Of the \$802 million, the Mississippi Valley Division allocated \$510 million to channel improvement features, \$128 million to Mississippi River levees, \$161 million to sub-basins and \$12 million to MR&T harbors. Of the \$501 million set aside for channel improvements, the bulk of that amount – \$461 million – went toward costly revetment repairs, with \$27 million going to dike repair and \$13 million for dredging. The influx of emergency funds created a flurry of activity. During 2012, the Mississippi Valley Division placed more than 438,000 squares of articulated concrete mattress (ACM) revetment, including 334,000 squares on the critical sites damaged during the 2011 flood. To put that total amount of revetment placed along the banks of the lower Mississippi River during 2012 into perspective, if all 438,000 squares were placed end to end, the line would extend from Washington, D.C, to Las Vegas, Nevada.

The flurry of activity was not limited to channel improvements. By the end of 2012, the Corps of Engineers had awarded contracts for 24 of the top 28 repair projects on the original MR&T priority list, with phase II of the Merriwether-Cherokee revetment, the levees at Tara and Old River, and the structural repair at Morganza representing items not under contract. Sixteen of the top 28 projects on the list, including the long-elusive relief well project at Island 8 in Fulton County, were already complete by year's end. Operation Restore, the 28th ranked priority on the list that served as the center of so much tension and turmoil during the recovery process, was also complete for all intents and purposes, fulfilling Walsh's and the Corp's promise to "makes things right." As for the entire original priority list of 93 projects, the engineer districts completed 11 of the 32 levee projects, 15 of the 22 channel improvement projects and one of the structures projects within a year of the passage of the emergency supplemental. By the close of 2013, the Corps of Engineers awarded contracts for all Class I and Class II repairs, with the exception of phase II at Merriwether -Cherokee. Only a total of 15 projects from the original priority list of 93 – 11 levee projects, 3 channel improvement projects and 1 structures project – remained to be completed. The rapid pace of progress continued into 2014. By the end of that year, all Class I and Class II levee repairs were complete, except for the Tara and Nash levee projects.

The supplemental funds not only allowed for efficient and timely construction and completion of flood control features, but the money also averted a tragedy of another kind. The rains that spawned the 2011 flooded ended almost as abruptly as they began. By the following summer, exceptional drought conditions gripped much of the great Mississippi drainage basin. In a twist of irony, a little more than a year after experiencing record or near-record high stages, many lower Mississippi River gages were nearing record low stages. The difference in elevation of the 2011 high stages and the 2012 low stages were staggering: 55 feet at Cairo, 57 feet at Memphis, 61 feet at Helena, 57 feet at Arkansas City, 58 feet at Vicksburg and 50 feet at Red River Landing. At no time in the history of the MR&T project had engineers been forced to contend with such extreme variations in stages over consecutive years. As river levels dropped and the rate of flow decreased, so too did the ability of the river to carry suspended sediment. Before long, ports and harbors along the river silted in and new sand bars formed in the navigation channel.

The severe low water, though, highlighted the somewhat hidden beauty of the MR&T project. It not only protects cities, farms, manufacturing centers, industry and investments from floods, but it also provides a reliable navigation channel to facilitate the nation's waterborne commerce. The MR&T project sits strategically poised at the bottom of the greater Mississippi River drainage basin. Runoff from 41 percent of the continental United States covering 1.25 million square miles eventually enters the nation's waterways and passes through the MR&T system on its way to the Gulf of Mexico. The rivers comprising the inland waterway system



overlay the strategic majority of the nation's prime agricultural lands. The majority of the most fertile agricultural lands are within 120 miles of a navigable river and the many ports and harbors of various sizes that allow American farmers to affordably ship their massive yields to feed people around the world. Those same inland waterways and associated ports connect the industrial centers of Chicago, Kansas City, St. Louis, Memphis, Cincinnati, Pittsburg, Tulsa and other locations with the nation's busiest ports along the New Orleans to Baton Rouge corridor. The significance of the commerce on the riverside of the levees facilitated by the MR&T project, therefore, cannot be overstated.

One need look no further than the amount of emergency funding (62 percent of the \$802 million) that the Corps of Engineers allocated to

channel improvements to understand the symbiotic relationship between flood control and navigation improvements in the MR&T projects. In respect to the general public's understanding of the project, the navigation component is often overshadowed by the flood control features and the staggering figures for flood damages prevented, but in reality navigation and flood control features work together to allow commerce to thrive on both sides of the levees. So it was surprising that the emergency funds designed to help recover from the impacts of the devastating 2011 flood, enabled the nation's waterborne commerce to continue during the extreme low-water conditions.

While the channel improvements played a role in overcoming the low-water crisis, it was the dredging funds that had the greatest impact. Only \$25 million of the \$802 million in emergency supplemental funds for the MR&T project went toward dredging flood-induced sediment from the shallow-draft channel between Cairo and Baton Rouge and the shallow-draft

harbors that provide crucial access to the marine interstate system. Of greater significance was the \$175 million in Operations and Maintenance dredging funds also provided through the emergency supplemental bill. These funds removed flood-induced sediments from the upper Mississippi, the Gulf Inland Waterway, the J. Bennett Johnson (Red River) Waterway, the Ouachita and other inland waterway routes that serve as vital onramps onto the MR&T system. The funds also removed obstructions from the deep-draft waterways that connect the MR&T system to the Gulf of Mexico and overseas markets. All told, the Mississippi Valley Division spent a combined \$250 million on dredging. The timely arrival of the dredging funds, especially the \$200 million from the emergency supplemental bill, kept the nation's inland waterways open for commerce and helped prevent food shortages in the global market.

THE NEXT GENERATION

In light of the development that has taken place in the lower Mississippi Valley since the birth of the MR&T project in 1928, a repeat of the consequences of the 1927 flood and the impact on the national economy would have been unfathomable in 2011. Official estimates indicate that the MR&T project prevented more than one-quarter of \$1 trillion in flood damages during the 2011 flood. Today, the area flooded in 1927 is home to roughly four million people living in nearly one million households. It is also the site of more than 10.6 million acres of prime agricultural lands that produce revenues around \$7 billion each year while providing more than 100,000 jobs, not to mention feeding the world. That same area flooded in 1927 is now home to scores of manufacturers that generate more than \$100 billion in output and provide approximately 400,000 jobs; 12 major oil refineries (more than 100,000 bbl/d) with a combined capacity of nearly three million barrels per day, plus hundreds of thousands of oil and gas wells and related pipelines; and more than 100 power plants, including three nuclear power plants that account for more than 20 percent of the total power generated in the seven states comprising the alluvial valley. The area also has 3,600 miles of rail used by four major Class I freight carriers that nationally had a combined \$50 billion in operating revenues in 2011, as well as 5,100 miles of highways, including sections of five major interstates: I-10, I-20, I-40, I-55 and I-57. This infrastructure connects the manufacturers, retailers, farmers and energy producers of the region to a vital commercial artery that has more than 30 ports in the former flooded area, including four of the nation's busiest ports in south Louisiana, and moves roughly 500 million tons of cargo annually. These figures do not even account for the vast timber and mineral extraction industries or the world class tourism and outdoor recreation sectors that thrive in the area once devastated by the 1927 flood.³⁶

In this regard, those who live, work and play along the great river can accurately describe the success of the MR&T project in conveying the 2011 flood – and maintaining commerce



The left protects homes, farms, jobs, energy and infrastructure along the New Orleans to Baton Rouge corridor, while commerce continues to move along the river.

during the 2012 drought for that matter – as the realization of the long-held vision of successive generations of the triad who dared to dream that the unruly, unforgiving, unharnessed and undeveloped “frontier of opportunity” represented by the alluvial valley could be transformed into the secure economic behemoth – the Alluvial Empire – that it truly is today. We do so, however, absent any hubris as the history of flood control on the lower Mississippi is chock-full of examples of the horrors of arrogance and complacency. We also do so with great trepidation for a lingering question persists: will the MR&T system perform as designed in the next, and inevitably even greater, flood event?

This question is significant because the Mississippi River is not bound by yearly budget cycles and deficits. It does not oblige political wrangling or misplaced priorities. It does not yield to the myriad federal, state and local obstacles placed before it. Indeed, the Mississippi River never rests. It never takes a day off. Day after day the relentless river works silently to reclaim the alluvial valley that it helped to establish and applies immense pressure on the MR&T system designed to secure that economic powerhouse. Without constant vigilance, wise capital reinvestment and enduring maintenance, the river will once again demonstrate its power and dominance with devastating effects on people and commerce, as it has so many times in the past, while, perhaps, painfully reminding us that the MR&T project is a value-added investment and not a simple cost in the national budget.

The MR&T project is a dynamic and evolving system with a necessary never-ending life cycle. So, while many of the levees have been repaired, raised to project grade and greatly strengthened, and significant bank protection and channel improvements have been executed, much work remains to be done. In this way, the compelling story of restoring the system after the 2011 flood truly pales in significance to the next unwritten chapter of this great, yet still-developing narrative: the need to recapitalize, or perhaps re-engineer and re-design, the MR&T system for the future. The lessons learned from the introspective analyses contained in the official post-flood reports and crucial ongoing geomorphic and potamology investigations, flowline study updates and storm sequence analyses will largely shape the future history of the MR&T project.

A massive flood greater than anything experienced before will surely come. It is not a matter of if, but when. Ensuring that the MR&T project is prepared for a future test is the current generation of the triad's responsibility and our legacy for tomorrow. Will future generations look back on us with the same level of respect and admiration that is now bestowed on the members of the triad that built and matured the MR&T project that withstood the test of 2011? Will the United States Congress address current budget priorities to preserve and recapitalize arguably one of the most successful civil works projects in the world? Will everyday Americans shake free of complacency, recognize the value of the water infrastructure investment in place and acknowledge the protection it provides and the vital commerce it affords? Will environmental constituencies take the next step to shape a productive future that both improves our ecology and builds our economy? Will the Corps of Engineers spend future appropriations wisely, efficiently and purposefully based on a true partnership with the local people? Will those public monies result in the placement of dirt and concrete working in tandem with natural features to improve future-focused infrastructure, facilitate commerce and protect life, property and the ecosystem?

As the venerable MR&T project approaches the centennial anniversary of its founding, it is in desperate need of a renewed commitment from the triad of the people, the legislators and the engineers that will carry the project's demonstrated value forward for another 100 years. These questions and many others, inevitably, will be answered in time, and our legacies judged accordingly.

- ¹ Interview with Dennis Norris, by Charles Camillo, March 13, 2014.
- ² Camillo, Flood Notes, May 23; Interview with MG Michael Walsh, by Charles Camillo, August 25, 2011.
- ³ The history and evolution of the triad is a synthesis of four different studies: Robert W. Harrison, *Alluvial Empire* (Little Rock, Arkansas: Pioneer Press, 1961); Nan Elizabeth Woodruff, *American Congo: The African American Freedom Struggle in the Delta* (Cambridge, Massachusetts, 2003); Southern Alluvial Land Association, *The Call of the Alluvial Empire* (Memphis, Tennessee: 1919); and William A. Percy, *Lanterns on the Levee* (Baton Rouge, Louisiana: Louisiana State University Press, 1941). It is widely accepted that local entities spent \$292,000,000 on flood control up to 1928. The Mississippi River Commission and Harrison report that local contributions for flood control between 1879 and 1928 amounted to \$175,117,000. This leaves roughly \$117,000,000 as being spent prior to 1879; Harrison, *Alluvial Empire*: xvii, 159. Mississippi River Commission, Annual Report, 1928. James P. Kemper, *Rebellious River* (Boston: Bruce Humphries, Inc., 1949): 46. Kemper is the noted student of the river who opined on the flood problem.
- ⁴ Mississippi River Commission, Annual Report, 1915.
- ⁵ Southern Alluvial Land Association, *The Call of the Alluvial Empire*: 5.
- ⁶ Interview with Edward Belk, by Charles Camillo, March 12, 2014; Interview with Dennis Norris, by Charles Camillo, March 13, 2014; Camillo, Flood Notes, May 2; *Ibid.*, May 4; MVD, Operation Watershed Commanders Total System Brief, May 4; *Ibid.*, May 5.
- ⁷ Interview with Dennis Norris, by Charles Camillo, March 13, 2014; MVD, Operation Watershed Commanders Total System Brief, May 13.
- ⁸ HQ, U.S. Army Corps of Engineers, FRAGO 1 (USACE Guidance on Emergency Repairs) to OPOD 2011-50: Greater Mississippi basin Flood Repairs and Post-Flood Assessment of Response Operation, August 8, 2011; Interview with Dennis Norris, by Charles Camillo, March 13, 2014; Interview with David Busse, by Charles Camillo, April 29, 2015; Igor Linkov, et., al., “Assets Ranking Methods for Operation Watershed: Damage Assessment Oversight Committee,” August 18, 2011; Mississippi River Commission, Mississippi River and Tributaries System: 2011 Post-Flood Report: Documenting the 2011 Flood, the Corps’ response, and the performance of the MR&T System, December 2012 .
- ⁹ Mississippi River Commission, “Mississippi River and Tributaries Project: Recommended Active Priorities List,” DRAFT – August 15, 2011; Mississippi River Commission, 2011 Post-Flood Report, VI-1 – VI-2.
- ¹⁰ Linkov, “Assets Ranking Methods for Operation Watershed: Damage Assessment Oversight Committee,”; for a good discussion of the “battle over the floodways” and the trials experienced by the triad in the 1930s, please See Reuss, *Designing the Bayous*, and Camillo and Percy, *Upon Their Shoulders*.
- ¹¹ Proceedings of the Mississippi River Commission, 386th Session, Testimony of Lester Goodin before the Mississippi River Commission, New Madrid, Missouri, August 15, 2011; M.D. Kittle, “Corps sets March deadline for temporary fix of breached Birds Point levee,” *Southeast Missourian*, May 24, 2011.
- ¹² Interview with Milus Wallace, by Charles Camillo, November 11, 2011. Proceedings of the Mississippi River Commission, 386th Session, Testimony of Mayor Kevin Mainord before the Mississippi River Commission, New Madrid, Missouri, August 15, 2011. For other examples that depict the sentiment of floodway landowners, please see the formal statements for the record contained in the Proceedings of the Mississippi River Commission, Session 386, New Madrid, Missouri hearing. Evidence contained in the DRAFT Greater Mississippi Basin 2011 Flood, Post-Flood Operational Performance Assessment, produced by the U.S. Army Corps of Engineers and scheduled for possible publication in 2015-2016 indicates that the floodway task force discovered it did not run through its original supply of explosives upon return of the flotilla to the Enlsey Engineer Yard.
- ¹³ Letter from Senator Roy Blunt to col. Vernie Reichling, dated June 1, 2011. The letter is on Blunt’s letterhead, but it is co-signed by McCaskill and Emerson.
- ¹⁴ Memphis District, “Birds Point – New Madrid Floodway Phase IV Presentation,” May 25, 2011.
- ¹⁵ Email, Edward Belk to Charles Camillo, May 26, 2011, Subject: BPNM decision; Interview with Edward Belk, by Charles Camillo, March 12, 2014.
- ¹⁶ Memorandum from MG Michael Walsh to Commander, Memphis District, June 6, 2011, Subject: Direction for MO/IL/KY portion of MR&T project system.
- ¹⁷ Camillo, Flood Notes, April 27 thru May 2. Examples of the anti-levee articles: Frank Thomas, “Mississippi flood control: Major changes urged,” *USA Today*, May 18, 2011; editorial, “Rethinking the Levees,” *Commercial Appeal*, June 29, 2011.
- ¹⁸ Proceedings of the Mississippi River Commission, 386th Session, Testimony of Lester Goodin before the Mississippi River Commission, New Madrid, Missouri, August 15, 2011; Letter from Missouri Governor Jeremiah “Jay” Nixon to MG Michael Walsh, dated June 6, 2011.

- ¹⁹ Memorandum from Col. Vernie Reichling to MG Michael Walsh, June 14, 2011, Subject: Direction for MO/IL/KY portion of MR&T project system.
- ²⁰ Email, Glenda Jackson to James Bodron, et., al., June 16, 2011, Subject: FY 2012 House Markup; Memorandum from MG Michael Walsh to Col. Vernie Reichling, June 15, 2011, Subject: Birds Point – New Madrid (BP-NM) Direction based on Memphis District Recommendation.
- ²¹ Operation Watershed Recovery Operations Status Report for Week of 4 July 2011; Ibid.; for week of 11-15 July 2011; Ibid.; for week of 15-19 August 2011. For examples of the testy relationship developing between representatives of the levee districts and the Corps of Engineers over new levee safety initiatives, please review the testimony provided during the 380th through 385th sessions that are contained in the Proceedings of the Mississippi River Commission.
- ²² Thomas Minyard, “Letter Report: Preliminary Assessment and Evaluation for the MO/IL/KY Portion of the MR&T Project, dated July 13, 2011. See also, Memorandum from Col. Vernie Reichling to MR Michael Walsh, July 19, 2011, Subject: Direction for MO/IL/KY portion of the MR&T project system.
- ²³ The discussion covering Maj. Gen. Walsh using the floodway as leverage to secure funding for the most critical repairs entirely the opinion of the author based on evidence and circumstance. Maj. Gen. Walsh maintains that his logic was entirely on a systems approach.
- ²⁴ Interview with Stephen Gambrell, by Charles Camillo, December 5, 2014; Letter from Mike Ross, et., al., to the Honorable Hal Rodgers and the Honorable Norm Dicks, dated 13 July 2011; Letter from U.S. Senators Roger Wicker and Mary Landrieu to the Honorable Daniel Inouye and the Honorable Thad Cochran, dated July 22, 2011
- ²⁵ Mississippi River Commission, Executive Summary,: 385th and 386th Sessions; Proceedings of the Mississippi River Commission, 386th Session, Testimony of the Honorable Jo Ann Emerson before the Mississippi River Commission, New Madrid, Missouri, August 15, 2011; Ibid., Testimony of U.S. Senator Roy Blunt. .
- ²⁶ Ibid., Testimony of the Furg Hunter; Ibid., Testimony of the Carlin Bennett; Ibid., Testimony of the Lester Goodin; Ibid., Testimony of the David Weatherly.
- ²⁷ Email, MG John W. Peabody to MG Michael Walsh, et., al., August 16, 2011, Subject: Concerns with BPNM Levee Reconstruction vs. MR&T System Risk.
- ²⁸ Email, Stephen Gambrell to Sam Angel, RD James, and William Clifford Smith, September 26, 2011, Subject: Emergency Fund Transfer Notifications to Congress; Operation Watershed Recovery Operations Status for Week of 10-14 October, 2011.
- ²⁹ Information contained herein on all the Class I projects was obtained from Information Papers for each critical repair site. The information papers were prepared by the recovery team and used to rank the repair projects.
- ³⁰ Memphis District, Operation Make Safe Project Update, October 31, 2011.
- ³¹ Memphis District, “Birds Point-New Madrid Floodway Brief to MG Walsh and MRC Staff, Reconstruction of the Frontline Levee,” October 11, 2011; Memorandum from MG Michael Walsh to Col. Vernie Reichling, October 19, 2011, Subject: Birds Point-New Madrid (BP-NM) Direction Interim Restore; Operation Watershed Recovery Operations Status Report for Week of 10-14 October; Ibid., Week of 17-21 October; Proceedings of the Mississippi River Commission, 386th Session, Testimony of the David Weatherly before the Mississippi River Commission, New Madrid, Missouri, August 15, 2011.
- ³² Email, Stephen Gambrell to Sam Angel, RD James, William Clifford Smith, October 4, 2011, Subject: FY12 Continuing Resolution update – zero for the Corps; Mississippi River Commission, “Phase II: Recommended Additions to Active Priorities list.”
- ³³ Interview with Maj. Gen. John W. Peabody, by Charles Camillo, June 5, 2015.
- ³⁴ The self-financing effort brought in a total of \$170 million to the Mississippi Valley Division. Only \$149 million of that amount went toward MR&T repairs. The remaining \$21 million in self-financing funds went toward non-MR&T repair projects within the division footprint. Of the \$149 million that went toward MR&T repairs, \$81 million represented repurposed FCCE funds and \$68 million came from unused FY 2012 MR&T maintenance and construction funds.
- ³⁵ Memphis District, Operation Make Safe Project Update, December 14, 2011; Camillo, Flood Notes, November 15, 2011.
- ³⁶ Industrial Economics, Inc., Economic Profile of the Lower Mississippi River Region (Cambridge, Massachusetts, 2004). This report states that in 1998 manufacturing generated \$87 billion in revenues and provided 383,000 jobs. The \$87 billion figure, when adjusted for inflation, amounts to approximately \$126 billion in revenues in 2014, ES -3, 10-1; Oil and Gas Journal, List of Oil Refineries in the United States, 2014; Economic Profile of the Lower Mississippi River Region, ES-3, 8-1; Association of American Railroads, Class I Railroad Statistics, April 17, 2013.