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Winter 2007-08

The **COAST GUARD** Journal of Safety
& Security at Sea

PROCEEDINGS

of the Marine Safety & Security Council

***Supporting the safety, security,
and economic stability
of the heartland***

***Steadfastly standing the watch along
our nation's rivers***

***Homeland security, search and
rescue, environmental response***

***Operational, tactical, and
navigational challenges – minor
incidents, major consequences***

***Protection of critical infrastructure
and key resources***

Also Inside:

Lessons Learned: Three vessels collide, closing a busy shipping channel

U.S. Coast Guard Western Rivers Sectors

PROCEEDINGS



Winter 2007-08

Vol. 64, Number 4

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District Commander's Perspective

By REAR ADMIRAL JOEL R. WHITEHEAD
Commander, Eighth District

The Coast Guard prides itself on being a multi-mission service. We perform a tremendous number of tasks around the world every day. While some of these tasks and locations are more apparent to the public eye than others, all of the Coast Guard's tasks—and the locations where they are performed—are important.

The Coast Guard's strong presence along the nation's rivers is one example of our perhaps lesser-known but equally valuable contributions to the nation. The Western Rivers system connects Chicago and St. Louis with New Orleans; Pittsburgh with Houston; and the grain states of Oklahoma, Arkansas, Missouri, Iowa, and Kansas, just to name a few, with the Gulf Coast and international shipping. Coast Guard units along this system of rivers work tirelessly to maintain safe and secure waterways. They protect these valuable routes for the passage of economic goods, maintain balance between commercial and recreational traffic, and watch over critical infrastructure. Materials transported through the inland waterway system are valued at over \$70 billion per year!

As commander of the Eighth Coast Guard District, I have the privilege of working with both river and coastal units. The similarities and differences between the two are fascinating. Because coastal units, as a whole, typically receive more public attention, many readers may be surprised to learn the critical roles that the rivers play in our nation's economy. As the articles in this issue demonstrate, the rivers are continually busy, which is vital to our nation's economic stability and security. The same can be said of the Coast Guard units steadfastly standing watch over them.

I am extremely proud of the work our men and women are doing along our nation's waterways. It is comforting to know that the Coast Guard is working in so many places, always vigilant and available to help. I hope that this issue of *Proceedings* accurately illustrates the tremendous breadth of responsibilities for which the Coast Guard as a whole is responsible, and that the information provides readers with a greater appreciation for the impressive work being done along the Western Rivers system.

ADM Thad Allen
Commandant
U.S. Coast Guard

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Champion's Point of View



BY CAPT JOHN R. BINGAMAN
former Commander, Sector Ohio Valley

An inland Coast Guard unit might sound like a contradiction to many people. After all, doesn't the Coast Guard, by definition, guard the *coast*? Yes, that's true, but there are more than 22,285 miles of inland rivers in the United States of which 14,000 miles are commercially navigable, and maintaining safety and security on them is just as crucial a role to the Coast Guard as guarding the coasts.

The inland rivers serve as major highways for commerce, transporting millions of tons of cargo each year. From the coal that generates electricity to gasoline that fuels our cars to salt that helps clear our snowy roads, inland rivers are the primary pathways for delivery to countless U.S. cities. The Western Rivers specifically (an area encompassing 22 states, from the Canadian border in North Dakota to the Mississippi River in Louisiana, and from the Appalachian Mountains in West Virginia to the Rocky Mountains in Wyoming) are home to numerous industries. Major chemical, fuel, and refinery plants line these river banks, continually transporting their products from the production facilities to various locations up and down the rivers.

Like all Coast Guard units, the Western Rivers units must vigilantly perform a number of missions such as homeland security, search and rescue, and environmental response. Where the Western Rivers units differ is in their response to these missions. Their areas of responsibility are vast—so large that some areas require a day of travel to reach ... not a quick trip when responding to an accident. The rivers they serve are also unpredictable, with water levels sometimes changing in mere hours. Accidents can block waterways and stop traffic for days, halting delivery of numerous and valuable economic goods. These are just a few of the many challenges that the Coast Guard continually encounters, and it is these challenges that are highlighted in this issue of *Proceedings*.

Someone once asked me if a Coast Guard tour on the rivers was "a sleepy one, with very little to do." The reality is actually quite the opposite. The Coast Guard's numerous, consistently active, and demanding responsibilities are underestimated by many, even by some within the Coast Guard. This *Proceedings* issue, therefore, highlights both the quantity and quality of vital work performed on the Western Rivers by the Coast Guard. My hope is that readers will gain a better understanding of and appreciation for the river units, and realize just how mistaken the "sleepy" perception is.

The articles, which provide a small sampling of the Coast Guard's numerous responsibilities, have been written by Coast Guard field units, partnering government agencies, and the maritime industry. Like our work on the water, this *Proceedings* issue could not have been complete without the contributions of all parties. I thank the authors for both their time in helping to explain the role of the Coast Guard and some of our partners on the Western Rivers, and for the work they do every day to keep our waters safe and secure.

Mark Twain, noted author and a river boat pilot on the Mississippi River, once commented, "No one can learn all there is to know. The subject is just too big. Besides that, it changes every day." Hopefully this edition of *Proceedings* will offer some interesting insight into life on the Western Rivers.



Coast Guard on the Western Rivers

by CDR KEVIN KIEFER

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Rivers are unique systems, succinctly described by an ancient Greek proverb that observes, “It is not possible to step twice into the same river.” This observation is true, since a river is always changing. Rain water, current, debris, and numerous other factors can quickly change the path, width, and depth of a river, making navigation by even the most experienced of its mariners a challenge.

But the challenge is worth it on the Western Rivers of the United States, where almost one-sixth of the nation’s intercity cargo transits annually. Some of the cargo includes coal, petroleum, grain, and farm products; aggregate stone and gravel used in construction; metal and mineral ores; and certain dangerous cargoes such as chlorine and anhydrous ammonia.¹ The Western Rivers provide an extremely cost-effective and efficient means of transporting bulk commodities throughout the country, supplying valuable goods to millions of people, generating numerous jobs, and producing economic benefits for end users. With the substantial waterways traffic, though, comes another challenge—maintaining safety and security for the people and companies who work on and near the water.

Coast Guard Responsibilities

The Western Rivers (also known as the Inland Rivers) refers to the area from the Canadian border in North Dakota to the Mississippi River in Louisiana and from the Appalachian Mountains in West Virginia to the Rocky Mountains in Wyoming, encompassing 22 states in all. Three Coast Guard sectors are in charge of maintaining the safety and security along these rivers—Sector Lower Mississippi River, Sector Upper Mississippi

River, and Sector Ohio Valley—all of which are included within the Coast Guard’s Eighth District.

Each sector, while separate in its command and area of responsibility (AOR), shares different portions of the same waterways and therefore sees many of the same vessels and works with many of the same companies and facilities. Partnership among the three sectors is essential in maintaining a unified Coast Guard posture as well as a safe, secure maritime community. Responsibilities for the three sectors include:

- port and waterway safety and security,
- marine environmental protection,
- industrial facility inspections and investigations,
- search and rescue coordination,
- aids to navigation operations,
- commercial vessel safety,
- maritime law enforcement,
- merchant licensing and documentation,
- contingency planning,
- disaster relief,
- recreational boating safety,
- logistics and support.

The list is long, but each responsibility is important. While many of these responsibilities are the same ones expected of other Coast Guard units, the implementation of them on the Western Rivers can be quite different, especially as compared to coastal units. For example, protection of critical infrastructure—such as bridges, refineries, and chemical facilities—is more dif-

ficult. Unlike coastal areas, where the majority of critical infrastructure is relatively close and confined to a specific geographic port, the AORs of the three Western Rivers sectors are vast, with infrastructure spread over a large region, and, in some cases, extremely far from Coast Guard resources. Additional time and resources must be spent to provide proper inspections and certifications. This distance also translates into longer response times when emergencies occur.

It is during such times that the close coordination and strong working relationships among Coast Guard units and other government agencies can readily be seen. State agencies such as the Ohio Department of Natural Resources and West Virginia Department of Environmental Protection and local fire and police departments can provide the needed comprehensive, on-scene knowledge and resources that help supplement Coast Guard units.

Also, while portions of the Western Rivers are relatively wide, for the most part the rivers are narrow and less forgiving of navigational errors. Vessel groundings, damaged locks and dams, breakaway barges, and river closures are just some of the problems that can keep the Coast Guard continually busy. Each sector, therefore, works valiantly to maintain safety and security not only for the personnel and infrastructure within its own AOR, but also for those affected further up and down the rivers in the other sectors.

Sector Lower Mississippi River

Sector Lower Mississippi River (SLMR), located in Memphis, Tenn., was established from the consolidation of Marine Safety Office Memphis and Group Lower Mississippi River in July 2005. Its AOR includes all or part of six states: Arkansas, Louisiana, Mississippi, Missouri, Oklahoma, and Tennessee. It encompasses more than 2,200 miles of the Mississippi, White, Arkansas, Black, Ouachita, Red, and Yazoo Rivers and their major tributaries. Some port areas included in the AOR are Memphis, Tenn.; Catoosa, Okla.; Greenville, Miss.; Shreveport, La.; Little Rock, Ark.; Caruthersville, Mo.; and Vicksburg, Miss.

According to CDR P.J. Maguire, commander Coast Guard SLMR, "Our mission is simple: to try and prevent bad things from happening and if they do, prevent them from getting worse. In broad terms, we are in the business of managing risks in the maritime environment—safety risks, security risks, environmental risks, and mobility risks. The easiest way to eliminate risks in the maritime environment would be to tie everyone

to the dock and shut down the waterways. This, of course, would severely impact commerce and is not going to happen. So, every day we must balance safety, security, and environmental risks with mobility. Each day we manage today's risks to prevent tomorrow's casualties."

Sector Lower Mississippi River helps facilitate the movement of large quantities of bulk commodities and raw materials throughout its area of responsibility by partnering with industry stakeholders and enforcing waterway safety and security. The sector has oversight of numerous vessels, including newly constructed mobile offshore drilling vessels and five high-capacity casino vessels in Shreveport, La. Additionally, there are numerous marine service companies (barge and towing companies, shipyard and repair facilities, fleet and harbor services, and boat stores and refuelers) and designated waterfront facilities that handle, transport, and store products.

There are myriad geographical challenges within Sector Lower Mississippi River's AOR. This not only makes it difficult for Coast Guard personnel to conduct marine inspections and investigations in hazardous conditions with limited logistics, but also affects the movement of commerce in the area. In addition to the vast expanse of



Sector Lower Mississippi River is the parent command for the following sub-units:

- two marine safety detachments: Greenville, Miss. and Fort Smith, Ark.
- six shoreside support detachments: Memphis, Tenn.; Greenville, Miss.; Sallisaw, Okla.; Natchez, Miss.; Pine Bluff, Ark.; and Vicksburg, Miss.
- six river tenders: *Kankakee* (Memphis, Tenn.); *Greenbrier* (Natchez, Miss.); *Kanawha* (Pine Bluff, Ark.); *Kickapoo* (Vicksburg, Miss.); *Muskingum* (Sallisaw, Okla.); *Patoka* (Greenville, Miss.).
- one aids to navigation team: Colfax, La.
- one LORAN station: Boise City, Okla.
- two regional exam centers: Memphis, Tenn. and St. Louis, Mo.



infrastructure, there are several large highway crossings of the Mississippi River, including the major Interstate 20 and Interstate 40 corridors and railroads. Much of the sector's area of responsibility, which does not have locks and dams to control the flow of river currents, consists of free-flowing navigable waterways. The lower Mississippi River levels vary over a 50-foot range from drought levels to flood stages and require continuous movement of aids to navigation to properly mark the channel. Both high and low water conditions impact the navigable waterways and accelerate occurrences of marine casualties, particularly involving towing vessels transporting large tows (greater than 40 barges).



Sector Upper Mississippi River is the parent command for the following sub-units:

- three marine safety detachments: Peoria, Ill.; Rock Island, Ill.; St. Paul, Minn.
- five river tenders: *Cheyenne* (St. Louis, Mo.); *Sangamon* (Peoria, Ill.); *Scioto* (Keokuk, Iowa); *Gasconade* (Omaha, Neb.); *Wyaconda* (Dubuque, Iowa).
- one LORAN station: Gillette, Wyo.

Two major U.S. Army Corps of Engineers (USACE) projects are underway to help control the Mississippi River. One is at the Old River Control Complex to prevent rerouting of the lower Mississippi River to the Atchafalaya basin. The second is at the Montgomery Point Lock and Dam to prevent the loss of navigation between the Arkansas River navigation system and the lower Mississippi River. These projects are critical to facilitating the movement of commerce because the vast majority of products and commodities that flow along the Mississippi River pass through SLMR's AOR.

Sector Upper Mississippi River

Located in the heart of St. Louis, Mo., Sector Upper Mississippi River (SUMR) has the largest geographic area of responsibility of any sector within the lower 48

states. Its AOR spans all or part of 11 states: Colorado, Illinois, Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota, Wisconsin, and Wyoming. It encompasses more than 3,800 miles of the Missouri, upper Mississippi, and Illinois Rivers and their major tributaries. The AOR also includes 33 locks and dams and 238 bridges. The sector is also responsible for several major interstate lakes, and is home to the famed "Party Cove" on Lake of the Ozarks, Mo.

This vast area of responsibility presents many challenges. With responsibilities in 11 states, SUMR's resources are spread very thin and response time to incidents such as marine casualties or discrepancies in navigation aids can sometimes be measured in days instead of hours. This geographic diversity also presents many challenges when it comes to protecting the nation's critical infrastructure and working with state partners. It is only through strong partnerships with the Coast Guard Auxiliary, state and federal partners, and industry stakeholders that SUMR is able to meet its mission goals.

One interesting aspect of this sector is its large fleet of inspected amphibious vessels, which are built to operate both on land and water. Sometimes referred to as "duck boats," these vessels are commonly known by their previous military designation, DUKWs. This World War II-era military vehicle terminology indicates that the vehicle/vessel was originally designed in 1942 (D), is a utility/amphibious (U), has all-wheel drive (K), and has two powered rear axles (W). Because the DUKWs must be certified for both land and water travel, Coast Guard inspections of these vessels are understandably different from other inspections.

Also interesting is the way navigation buoys are set without the aid of large, heavy anchors on the Missouri River. Instead of placing the buoys using a traditional anchor and chain set-up, these aids are set into the river bottom using a water jet to drive a metal plate into the river bottom to hold the buoy on station.

Sector Ohio Valley

Sector Ohio Valley (SOHV) is located in Louisville, Ky., near the Ohio River. Its area of responsibility includes all or part of 10 states: Alabama, Illinois, Indiana, Kentucky, Mississippi, Missouri, Ohio, Pennsylvania, Tennessee, and West Virginia. It encompasses more than 8,000 miles of navigable waterways (3,000 miles used commercially); 11 major rivers; and 29 major lakes on the Ohio, Tennessee, Mississippi, and Cumberland Rivers and their major tributaries. The sector was established in June 2005

when Marine Safety Office (MSO) Louisville, Ky.; MSO Pittsburgh, Pa.; MSO Huntington, W.Va.; MSO Paducah, Ky.; and Group Ohio Valley merged.

CAPT John Bingaman, former commander, Coast Guard Sector Ohio Valley, identifies the sector's objective as being "the safety and security of Americans who live and work on or along the Western Rivers system, which directly facilitates the annual flow of more than \$45 billion of products and commodities that are vital to our nation's economy." Some of the products that traverse these waterways include coal, petroleum products, chemicals, grains, and manufactured goods.

Two elements unique to this sector are its vessel traffic service (VTS) and boating safety and security team (BSST). Sector Ohio Valley is the only Western Rivers sector to have a VTS, which helps manage the Ohio River between miles 592 and 606 during periods of high water and swift current. The VTS is activated when the upper river gauge at the McAlpine Lock and Dam reaches 13 feet, and it remains in 24-hour operation until the upper river gauge falls below 13 feet. The BSST, created in 2001, conducts vessel boating and safety boardings on recreational boats throughout the Eighth District. (See the article "Promoting Safe Operations: Recreational Boating on the Western Rivers" for additional information.)

Within the AOR are more than 80 navigational locks and 200 major dams. Dams are built to hold back water, form deeper navigation pools, and allow vessels to use a series of locks to "step" up or down the river from one water level to another. The U.S. Army Corps of Engineers operates the locks and dams for navigation, while the Coast Guard is responsible for maintaining safety of the waterways around them. Because naviga-

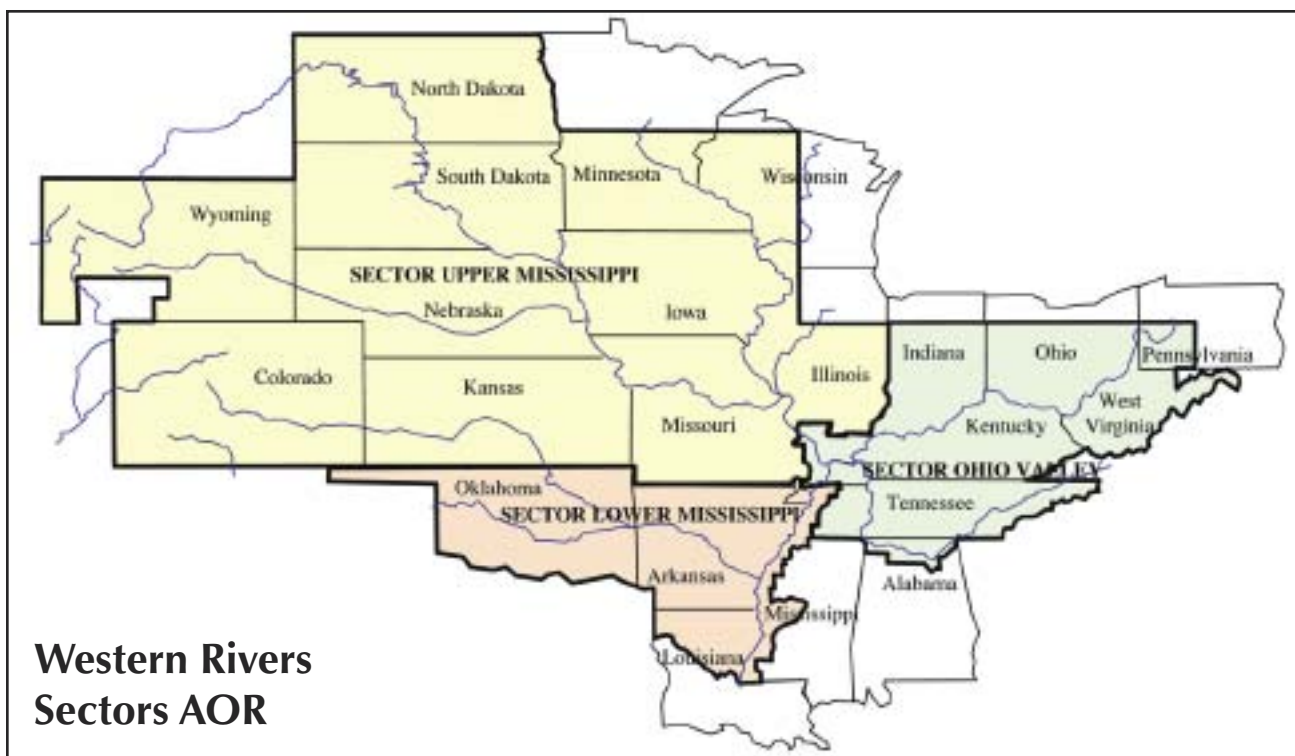


Sector Ohio Valley is the parent command for the following sub-units:

- three marine safety units: Pittsburgh, Pa.; Huntington, W.Va.; Paducah, Ky.
- two marine safety detachments: Cincinnati, Ohio and Nashville, Tenn.
- six river tenders: *Chena* (Hickman, Ky.); *Chippewa* (Paris Landing, Tenn.); *Cimarron* (Paris Landing, Tenn.); *Obion* (Owensboro, Ky.); *Osage* (Sewickley, Pa.); *Ouachita* (Chattanooga, Tenn.).
- five shoreside support detachments: Sewickley, Pa.; Chattanooga, Tenn.; Paris Landing, Tenn.; Owensboro, Ky.; Hickman, Ky.
- one LORAN station: Dana, Ind.

tion around locks and dams can be treacherous, SOHV stays busy. Typical incidents that occur at locks and dams include towboats losing their barges, vessels hitting lock and dam structures (thus potentially impacting their structural integrity), and vessels getting caught in the current and going over the dams. When any of these events happen, the Coast Guard must quickly determine the safest course of action regarding waterway management. Actions may include temporary waterway closures to recover barges or inspect a bridge or dam's structural integrity, inspections and in-





vestigations of accidents, and search and rescue missions. Partnership with USACE is critical to prevent accidents from occurring and respond to them quickly and effectively if they do.

SOHV contains the nation's largest inland port in terms of annual tonnage, the Port of Huntington, W.Va./Tri-State. This port is also the fourth largest overall tonnage-wise. Only the Port of South Louisiana (New Orleans area), Houston, and New York/New Jersey transfer more tonnage. SOHV is also home to four of the nation's 55 military and economically strategic ports.²

MSU Paducah, Ky. also sees substantial traffic. Approximately 12,000 tows, with one to 30 barges per tow, pass through MSU Paducah's area annually. No place is this more evident than in Cairo, Ill., the "Grand Central Station" of towboats. It is at Cairo where the Ohio River flows into the Mississippi River, a noteworthy fact since the Ohio River is the largest of all the Mississippi's tributaries (measured by water volume).

As the second-largest inland tonnage port in the nation³ and the headlands of the Western Rivers system, the MSU Pittsburgh, Pa. area is the point of origin and termination for commerce on the Western Rivers system as well as a source of recreation for the local community. The MSU is responsible for 60 regulated waterfront facilities that conduct more than 2,000 transfers annually, involving over 50 different hazardous cargoes.

The Western Rivers comprise critical paths along the nation's inner cities, providing valuable commerce throughout the nation. Protecting these waters, and maintaining the safety and security of their surrounding maritime communities, is a key mission for the Coast Guard, and one that provides many unique and interesting challenges for those members fortunate enough to serve here.

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Endnotes:

- ¹ U.S. Army Corps of Engineers, "Inland Waterway Navigation: Value to the Nation," May 2000.
- ² Waterborne Commerce Summary Tables (for 2005), U.S. Army Corps of Engineers, February 2007.
- ³ Ibid.

Taking Port Security to the Rivers

by LT STEVE PEELISH

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There has always been a need to protect the flow of commerce on the 14,000 miles of America's inland navigable waters, consisting of 41 rivers and lakes across 22 states. These Western Rivers waterways are essential to the movement of bulk cargoes and manufactured goods.

To ensure that the cargo moves safely and in compliance with applicable federal laws, the U.S. Coast Guard maintains an active presence at strategic river ports. Following the September 11, 2001 terrorist attacks, Coast Guard men and women—including active duty, reserve, and auxiliary members—increased their efforts to ensure that this vital transportation link would remain protected and prepared to respond to events, natural or intentional.

Maritime Transportation Security Act

Designed to protect the nation's ports and waterways from terrorism, the Maritime Transportation Security Act of 2002 (MTSA) was signed into law on November 25, 2002. MTSA requires vessels and port facilities to conduct vulnerability assessments and develop security plans that include one or more of the following:

- passenger, vehicle, and baggage screening procedures;
- security patrols;
- establishment of restricted areas;
- personnel identification procedures;
- access control measures;
- and/or installation of surveillance equipment.

Specifically within the boundaries of the Western Rivers, the Coast Guard operates three sector commands, three marine safety units, and seven marine safety detachments, all charged with enforcing MTSA requirements.

During MTSA's initial implementation phase, these offices were responsible for proper implementation of 500 marine transportation-related facilities, 800 uninspected towing vessels, and 1,000 certain dangerous cargo (CDC) or hazardous cargo barges. It was an enormous undertaking. The result has been worth it, though; by creating a consistent security program for all the nation's ports, the Coast Guard and industry are now better prepared to identify and deter threats. Though enacted almost six years ago, Maritime Transportation Security Act compliance remains a constant focus throughout the Coast Guard and maritime industry.

The U.S. inland commercial fleet and maritime waterfront facilities are the heart and soul of the maritime industry. Under the Maritime Transportation Security Act, each vessel or facility is required to operate under the parameters of a Coast Guard-approved security plan. The vessel security plans are designed to ensure that the vessel is secure and under the positive control of the assigned crew.

The facility security plans require each facility to implement mandatory access control measures to ensure that only authorized people are able to gain entry. These plan requirements establish designated restricted areas within the facility gates and screening protocols



to ensure that cargo transport vehicles and persons entering the facility are scrutinized, deterring unauthorized introduction of dangerous substances and devices. Vessel and facility owners are fully responsible and accountable for the security of their operations and infrastructure.

Vessels move everything from non-regulated cargo such as coal, grain, and rock, to regulated cargo such as petroleum products and hazardous chemicals. With a large number of vessels in constant transit, it's important to know which ones are carrying potentially dangerous cargo and require additional security measures. To aid maritime domain awareness along the Western Rivers, the Eighth Coast Guard District created the Inland River Vessel Movement Center (IRVMC). Each year the IRVMC tracks more than 36,000 transits of CDC barges, including thousands of transits through high-population areas, at 94 individual reporting points throughout the entire 14,000 miles of the inland river system.

The location of barges carrying specified cargos is constantly reported to IRVMC. The Coast Guard units are able to access this data and use it for maritime domain awareness and to schedule security boardings and escorts, based on individual risk associated with the movement of the cargo.

Critical Infrastructure and Vessel Escorts

A primary focus of the Coast Guard is the protection of citizens of river communities, maritime industries, and waterways. This mission of maritime security is multifaceted and comes with many challenges. Two major areas of concentration are security checks of maritime critical infrastructure/key resources (MCI/KR) and vessel escorts.

The first is based on risk assessments performed by local Coast Guard units and vetted by the local area maritime security committee. These committees are comprised of industry professionals, Coast Guard personnel, and state and local law enforcement officers. The committees provide a vital forum for port stakeholders to work together in assisting the Coast Guard's mission to deter, detect, prevent, and respond to attacks against U.S. territory, population, and MCI/KR.

Information from these committees helps the Coast Guard decide where to focus efforts regarding security spot checks and site visits. The critical infrastructure and key resources throughout the Western Rivers

sectors include bridges, pipelines, and facilities that are important to residents' livelihoods and well-being.

Vessel escorts have become commonplace for Coast Guard crews and the maritime industry. If a vessel's transit situation meets a certain criteria, the vessel will be escorted and protected for the specified period of time or distance determined appropriate. The assistance of industry and other government agency partners is vital to this security effort.

Field Intelligence Support Teams

In an effort to improve the Coast Guard's response and defense posture, we have placed a greater emphasis on information collection and sharing—particularly at the port level—to support Coast Guard operators and decision makers. To that end, Coast Guard field intelligence support teams (FISTs) were created and are now primary contributors of information regarding local security efforts. There are field intelligence support teams assigned to each of the three Western Rivers Coast Guard sectors. At these sectors, FISTs support, train, and augment the unit's sector intelligence officers and command intelligence officers.

The field intelligence support teams' purpose is to enhance maritime domain awareness by supporting the local Coast Guard sector commander's informational needs as related to force protection, maritime safety and security, environmental violations, and criminal activity. This is accomplished primarily through a team's liaison with maritime stakeholders, including Coast Guard-regulated and non-regulated facilities and vessels; the maritime public; marina operators; and the service's multiple federal, state, and local law enforcement partners.

Additionally, through their liaison with the maritime community, FISTs promote the America's Waterway Watch (AWW) program. The AWW program is a na-



An MSU Huntington defender-class boat conducts training on the Ohio River near Huntington, W. Va. USCG photo by MST2 Nick King.

tionwide initiative—similar to the well-known and successful “neighborhood watch” program—which asks the maritime community to report suspicious activity to local law enforcement and/or the Coast Guard. Additional information on the AWW program can be found at www.americaswaterwaywatch.org.

Twenty-five-foot Defender-Class Boat

In 2005, Western Rivers units received a new instrument to protect America’s heartland from threats both foreign and domestic. With three brand-new 25-foot defender-class boats and the crews to run them, the security patrol detachment—the first of its kind—was formed and stationed at Marine Safety Unit Huntington, W.Va. The security patrol detachment concept has redefined the idea of homeland security on the inland river system. MSU Huntington’s three defender-class boats were the first boats to be delivered throughout the operating area, setting the stage to receive a total of 20 such platforms for all Western Rivers sectors.

The boats have greatly added to the units’ capability to maintain security previously unattainable. The highly maneuverable aluminum hull boats, manufactured by SAFE Boats International, are easily recognizable, with their massive twin outboards, large machine gun mounts fore and aft, and orange flotation collar.

Designed specifically for the Coast Guard, the defender-class boat is an extremely capable platform. Features such as a fully enclosed cabin with heater and shock-absorbing seats allow for greater comfort and ultimately greater crew sustainability under the adverse conditions in which boat crews are often required to operate (or when the crew is required to trailer the boat a long distance). The twin outboard four-stroke engines not only propel the boat to 40-plus miles per hour, but are also quieter and emit less pollution than a similar-sized two-stroke engine. Other features include a state-of-the-art navigation system and a communications suite, which allow Coast Guard crews to easily communicate with other federal, state, and local agencies as well as industry partners.

The defender-class boat is also what the Coast Guard terms a “standard boat.” This designation means that no matter where it is stationed, its capabilities, outfitting, and stowage plan are the same as any other de-

fender-class boat in the fleet. This allows the asset to be dynamic in that any boat crewman or coxswain who is qualified to operate it can deploy anywhere, board another defender-class boat, and be able to perform all duties required without any additional training other than area familiarization. With the same idea of deployability in mind, the boat and trailer combination is also designed to fit into a C-130 airframe, making it deployable worldwide.



Live Fire

Steel targets strategically line the banks of the shore throughout the winding river range, but they are no match for the marksmen assigned to the Coast Guard small boats.

During live fire, these teams not only fire the M240B mounted machine guns, but also unleash a barrage of live fire from their 40-caliber Sig Sauer pistols, Remington 12-gauge shotguns, and their long rifles—the 5.56MM, M-16, and shoulder-mounted M14T machine guns.

At the end of the course are bullet-laden vehicles placed at various distances on shore, where the tracer bullets from the M240B help guide the gunners. This scenario is far different than the typical live-fire exercises that are conducted well offshore, and is a more realistic simulation of what small boat operators could encounter while conducting homeland security missions.

Sector Ohio Valley members take aim at stationary targets on the shoreline at Salt River Range. USCG photos by LT Steve Peelish.

Salt River Range

Proper training is essential to understanding any boat, and the defender-class boat is no exception. The Army’s Salt River Range in Fort Knox, Ky., provides a unique water training range where the defender-class boat units can train. The range plays host to several Navy special operations teams along with civilian law enforcement agents for the most realistic vessel gunfire to be found anywhere.



After a successful trial performed by the Coast Guard's Maritime Safety and Security Team 91104 from Galveston, Texas, in 2006, the Salt River Range is now on the map for commands throughout the Coast Guard, enhancing training for the crews.

The Army has done a fantastic job covering logistics needs for this water range. With its berthing, communications, site safety training briefs, and weapons storage, Fort Knox offers a "one-stop location" for completing training needs. As evidenced by the 400-plus men and women from Coast Guard Districts Eight and Nine who have already taken advantage of this training opportunity, these exercises are invaluable.

As realistic and valuable as the training has been for other units, it is probably even more so for the ones assigned to protect the Western Rivers. These narrow rivers pose an eminent hazard due to the populations, facilities, and vessels that line the banks of the inland waterways. Weapons proficiency becomes paramount, and the Salt River helps to hone that skill.

With new laws in place to fight terrorism and the technology to support enforcement in today's climate of homeland security, it is no secret that the Coast Guard and its partners will continue to be ever present, ever vigilant, and always ready to defend the rivers of our heartland.

About the authors:

LT Steve Peelish has served in the Coast Guard for 18 years and is a former BM1. With three marine safety office (now marine safety unit) river tours, he has acquired a vast knowledge base of marine safety and security on the Western Rivers.

LTJ. Wayne Chapman has served in the Coast Guard for 16 years. He has served in the marine safety field for the last 14 years, most notably as chief of the Response Department at Marine Safety Unit Paducah, Ky.

LTJG Lee Bacon has served in the Coast Guard for 5 years. LTJG Bacon served onboard USCGC Walnut prior to attending Officer Candidate School, and is now chief of the Response Department at MSU Huntington, W.Va.

Lessons Learned

**From
USCG
Casualty
Investigations**

**Turn to page 84 for
this continuing series.**

As a regular feature in each issue of *Proceedings*, we will take an in-depth look at a recent marine casualty. We will explore:

What went wrong?

- We will delve into how the incident occurred.
- We will note any environmental factors, vessel design issues, and human error that contributed to the event.

What did the Coast Guard do about it?

- The articles will explain the U.S. Coast Guard marine casualty investigation.
- We will provide a detailed description of lessons learned.
- The articles will also document any changes in maritime regulations that occurred as a result.

Mayday, Mayday

Search and rescue on the Western Rivers.

by CDR P.J. MAGUIRE

Sector Commander, U.S. Coast Guard Sector Lower Mississippi River



True or False*

... the Coast Guard conducts search and rescue on Western Rivers?

... the Air Force conducts all inland search and rescue?

There are frequent misunderstandings regarding search and rescue (SAR) along the Western Rivers that have become ingrained through common misperceptions and continued repetition. SAR in this area during the early years of commercial navigation was, in fact, mostly “do it yourself.” Lacking any official search and rescue organization or policy, most mariners looked to their peers or to bystanders for help when in trouble. This history of self-reliance continues today, as the skilled captains and crew of workboats typically come to the aid of their peers in distress.

Ever since combining the Lifesaving Service and the Revenue Cutter Service in 1915, becoming today’s Coast Guard, the service has been continually present along the rivers. However, the only lifesaving station ever commissioned in the Western Rivers was the floating Louisville Lifesaving Station (Figure 1), which operated from 1881 to 1972 within sight of the treacherous Falls of the Ohio, a two-mile stretch of the Ohio River across which vessels drop 26 feet in elevation.

Maritime vs. Aeronautical SAR

Several ruling documents and U.S. laws intertwine to establish search and rescue policy, but most SAR organization has been driven at the international level. The International Aeronautical and Maritime SAR

*The answers are “true” and “false”, in that order.

manual is the highest order of these documents, a cooperative effort between the International Maritime Organization and the International Civil Aviation Organization. As may be obvious from these two drafting bodies, there is a rather clear distinction drawn between aeronautical and maritime SAR. The international agreements have also driven the designation of search and rescue regions (SRRs) and corresponding rescue coordination centers (RCCs).

At the next level are two other key documents—the National SAR Plan and the U.S. National SAR Supplement. In these documents, the United States has coordinated its internal SAR agencies and linked them to the international SAR network. Keeping in line with the air and maritime drivers, the SRRs are listed as either maritime or aeronautical.

U.S. SAR coordinators and search and rescue regions are delineated in the National SAR Plan as follows:

- The U.S. Air Force is responsible for the recognized U.S. aeronautical SRR corresponding to the continental U.S. other than Alaska.
- The U.S. Pacific Command is responsible for the recognized U.S. aeronautical SRR corresponding to Alaska.
- The U.S. Coast Guard is responsible for the recognized U.S. aeronautical and maritime SRRs



Figure 1: The floating Louisville Lifesaving Station. Courtesy U.S. Coast Guard Historian.

continued on page 17



A HISTORY OF LIFESAVING IN THE HEARTLAND

The *Sultana*

In 1865, the steam vessel *Sultana* was returning Union prisoners of war and other passengers from the city of Vicksburg, Miss., to the North. She suffered a catastrophic boiler explosion on the Mississippi River just north of Memphis, Tenn. At least 1,700 people perished when the vessel caught fire and sank.

Due to poor recordkeeping and accountability during boarding, the exact number of passengers is still disputed, and the number of lives lost is uncertain. Historians believe the number may have exceeded 1,800, even though many vessels came to the aid of the *Sultana* and hundreds were rescued. As such, the *Sultana* casualty may be America's worst maritime disaster. In comparison, the *Titanic* disaster claimed 1,500 lives.

The *M.E. Norman*

Another heroic story originates from the Memphis area in 1925. During an excursion sponsored by the Memphis Engineers Club aboard an Army Corps of Engineers vessel, tragedy struck. The vessel *M.E. Norman* was



The Tom Lee statue in Memphis, Tenn. Photo courtesy of the Memphis Center City Commission.

many miles south of Memphis in a remote area on the Mississippi River. There were 72 persons aboard when the vessel became unstable, capsized, and sank. Just upriver, one lone man in a small boat turned back after witnessing the capsizing. This man pulled 32 people from the fast-flowing Mississippi River. Others struggled to shore, but 23 lives were lost. This man conducted one of the greatest single-handed search and rescue efforts ever, and he didn't even know how to swim. His name was Tom Lee.

Today you can visit the Memphis park named after him and can spend time next to the mighty Mississippi River, where a statue has been erected in his honor.

The *Queen City*

Possibly the greatest rescue by the crew of the Louisville Lifesaving Station was in the early 1900s. According to files of the Coast Guard historian:

"On 17 February 1914, the steamer *Queen City*, on its way from Pittsburgh to New Orleans, got caught in a current at 1:30 a.m. after torrential rains had fallen. The ship headed for the falls with over 200 people on board. The *Queen City* came to a halt when it hit a rock, but the first few feet of the ship already nosed out over the falls. Two Coast Guard vessels arrived only five minutes

later and managed to rescue all 215 people on board within four hours."

The Great Flood of 1927

Many other rescues were made by Coast Guardsmen over the years, despite the lack of lifesaving stations. For example, a large Coast Guard relief fleet deployed to handle rescue activity following the great flood of 1927.



The Coast Guard's "relief fleet" on the Mississippi River after the great flood of 1927. U.S. Coast Guard Historian photo.

The Coast Guard Medal

In much more recent years, there was a rescue in the Memphis area that earned Reserve Petty Officer Stan Hayward one of the highest awards in the service—the Coast Guard Medal. The citation reads:

"Petty Officer Hayward is cited for heroism on 12 October 1996 while serving as crewman aboard the U.S. Coast Guard Utility Boat (UTB) 21550. The crew of UTB 21550 was on harbor safety patrol near the McKellar Lake area of the Mississippi River ... when they witnessed a vessel capsize. The seven occupants of the vessel were fishing when the boat was swamped by a six-foot wave caused by a passing towboat and barge. The UTB immediately diverted to the capsized vessel and spotted five of the victims clinging to the hull of the vessel, screaming that two small children hadn't surfaced.

Petty Officer Hayward immediately entered the water and swam through fuel oil, fishing line, and flotsam to the overturned boat. He dove under the vessel, fought his way through the debris to the air pocket, and found the two small children. Freeing the first child from entangling lines and wires, Petty Officer Hayward brought the young victim to the surface. He immediately dove back under the boat and retrieved the second trapped victim.

Petty Officer Hayward braved the strong river current and cold murky water and returned to the overturned vessel with a heaving line and life ring to aid the five adult victims, near panic and unable to swim. Petty Officer Hayward demonstrated remarkable initiative, exceptional fortitude, and daring in spite of imminent personal danger in this rescue. His courage and devotion to duty are most heartily commended and are in keeping with the highest traditions of the United States Coast Guard."

that coincide with the ocean environments, including Hawaii.

The National SAR Supplement contains charts further delineating the search and rescue regions. This is a source of some confusion, as the only clear search and rescue region for the non-coastal U.S. is the Langley SRR (Air Force). This is represented as an aeronautical search and rescue region. The corresponding Air Force rescue coordination center was originally three centers, which were consolidated to one RCC at Scott Air Force Base, Ill., in 1974. Then, in 1993, the rescue coordination center relocated to Langley Air Force Base. In March 2007, the RCC was moved again to Tyndall Air Force Base in Florida under the commander of the 1st Air Force. The Air Force considers this RCC to be the single agency responsible for coordinating *on-land* federal SAR activities in the 48 contiguous United States, Mexico, and Canada.

USCG Areas of Responsibility

In the U.S., the Coast Guard is responsible for all maritime search and rescue regions. Figure 2 shows the designation of maritime search and rescue regions, which may account for some of the confusion regarding SAR in the Western Rivers area. The chart lacks an obvious designation for maritime SAR across the “land” portion of the U.S.

In fact, the area is covered by the New Orleans SRR, administered by Eighth Coast Guard District. Three Coast Guard sectors in the Western Rivers area—Lower Mississippi River, Upper Mississippi River, and Ohio Valley—also operate under the control of the RCC in New Orleans. In the last year, for example, Sector Ohio Valley alone processed 234 SAR cases, according to CDR Greg Howard, deputy commander, Sector Ohio Valley.

This standard relationship and discussion of our SAR authority is detailed in the Coast Guard Addendum to the National SAR Supplement:

“The statutory authority for the U.S. Coast Guard to conduct SAR missions is contained in Title 14, Sections 2, 88, and 141 of the U.S. Code. The Code states that the Coast Guard shall develop, establish, maintain, and operate SAR facilities and may render aid to distressed persons and protect and save property on and under the high seas and waters subject to the jurisdiction of the United States ... In accordance with the National Search and Rescue Plan, the Coast Guard is responsible for or-

ganizing available SAR facilities in Search and Rescue Regions (SRRs) as defined in the National SAR Supplement. These waters generally include all navigable waters subject to the jurisdiction of the United States ... ”

The Nature of the Territory

In addition to the Ohio and Mississippi Rivers, there are numerous other rivers and lakes in this area that are used for recreational boating. Many of the rivers have been harnessed by dams, which form large lakes upstream. Commonly called “pooled water,” these systems have become havens for recreational boating activity.

All the activities that are common along our coasts are found in many parts of the Western Rivers, including canoeing, kayaking, waterskiing, jet skiing, kite surfing, houseboating, powerboating, and sailing. In addition, boaters engaged in fishing and hunting are extremely active during all four seasons.

The recreational boating activity alone represents surprisingly large numbers of people. Table 1 shows the 2005 Boating Law Administrator statistics for boater registration in several states in the Western Rivers region and some popularly regarded recreational boating hotbeds for comparison.

In addition to use of the rivers for leisure, there is also tremendous commercial use, which means that both the recreational boater and working mariners are at risk. Many of the SAR cases along the big rivers involve people falling off towboats and barges. With this much danger and this much activity on the waterways, you would expect there to be a search and rescue system in place to mitigate the risks.



Figure 2: Maritime SAR regions chart, from the U.S. National SAR Supplement.

USCG Search and Rescue

Therefore, Western Rivers SAR is fundamentally no different than any other Coast Guard SAR. In fact, it is conducted under exactly the same policies and procedures. Each sector in the Western Rivers is a designated



search and rescue mission coordinator and carries out SAR on behalf of the rescue coordination center along all the navigable waterways in its areas.

Virtually every other Coast Guard rescue coordination center contains oceans and rivers in its area of responsibility. For example, the Connecticut River, the Sacramento River, and the Hudson River are rivers found in coastal Coast Guard RCCs. Of course, the Coast Guard is obliged to carry out SAR coordination in those areas just as it does in the Western Rivers.

The Coast Guard Addendum contains much guidance on the conduct of SAR, including search planning for riverine waters:

“Drift in rivers is very complex. It is primarily due to river currents, which can be highly variable. Rivers are rarely straight and floating debris tends to collect along the banks in certain locations. Search objects can get hung up on obstacles, remain in place for some period of time, and then break loose again to continue drifting. It is even possible in some circumstances for objects to be found somewhat upstream of where they started drifting. When determining where to search, the maximum downstream and upstream limits of where the search object could be at the datum time should be estimated. The river and both banks should then be searched.”

The only real difference in Western Rivers SAR is 1) the frequency with which Coast Guard assets are deployed, and 2) that Coast Guard assets are not usually the primary search and rescue units. One will not find USCG small boat stations or air stations along the Western Rivers. Due to crew and funding limits, none of the Western Rivers boat or cutter units are held in the “firehouse” stance of our typical air and small boat stations. Therefore, the only Coast Guard assets typically applied for searches are buoy tenders and small boats operating in the vicinity of a given search area. Occasionally coastal air station assets operating in the vicinity are able to reach a search area in reasonable time.

STATE	RANK	REGISTERED BOATS
Arkansas	25	205,414
Indiana	22	214,696
Iowa	20	243,924
Kentucky	28	176,257
Missouri	13	326,749
Oklahoma	21	216,913
Tennessee	17	267,567
Connecticut	32	108,702
Florida	1	973,859
Georgia	14	318,212
Hawaii	51	15,302
Maine	31	111,756
Maryland	24	205,812
Massachusetts	29	150,026
New Jersey	26	199,106

Table 1: 2005 boater registration statistics from COMDTPUB P16754. Western Rivers states highlighted at top.

With no Coast Guard assets available in a given area and limited numbers of public and private searchers, an urgent marine information broadcast (UMIB) may become the only active element of a search. The UMIB is a regular callout over the radio network, advising the entire area of a suspected emergency. This may seem like a drastically different version of SAR until you consider many other maritime search and rescue regions. The same circumstance happens all over, particularly in offshore search areas like the Pacific Ocean. RCC Honolulu very often will not have air or surface assets to reach far offshore areas and can

only broadcast a UMIB to keep a search in active status. The same thing can happen for any RCC, especially during resource-intensive searches when air and boat station assets reach their crew fatigue limits.

The Coast Guard Addendum also cites the following for riverine searches:

“Local knowledge is particularly important when rivers are involved. In many areas there are local agencies with SAR responsibilities and/or volunteer SAR teams who possess valuable experience and knowledge. Units likely to become involved with SAR cases on rivers in their area of responsibility (AOR) should be familiar with all sources of local knowledge and data.”

Therefore, you will typically find large binders of contact information in each Western Rivers command center, containing each and every local agency that has SAR capability.

In fact, despite heavy Coast Guard involvement in SAR around the U.S., there is and will always be heavy reliance upon public agencies and citizens to prosecute both searches and rescues. In fact, nearly every Coast Guard-coordinated search involves one or more non-Coast Guard vessel(s) or aircraft. This exists everywhere in the country, but public reliance is often less necessary where the Coast Guard has small boat and air stations as well as SAR-capable cutters.

Coast Guard SAR Personnel and Equipment

Within each USCG sector command center, you will find SAR-qualified personnel—the operations specialists and civilian SAR controllers. Personnel are required to attend SAR school and to maintain proficiency in SAR duties. Use of computer search tools, such as C2PC and SAROPS, is less frequent in rivers command centers, since these tools are primarily designed for offshore searches. However, personnel are trained to stay sharp for future duty stations that require greater use of these tools.

Personnel on the 18 Coast Guard river tenders and within each sector's boat units are held to the same high standards for boat crew qualification. This gives them the necessary skills to conduct SAR when called upon by the sector command center. Each river tender carries two capable small boats, and the sector boat units are now fully outfitted with defender-class, 25-foot SAFE boats. Currently, there are 20 defender-class boats within the Western Rivers.

The Disaster Assistance Response Teams, known as DARTs, are unique to the USCG Western Rivers sectors. These highly mobile teams consist of 11 personnel and trailers loaded with three flood punts. A punt is a flat-bottomed boat with an outboard engine designed to operate in the shallow waters typically found in flooded areas. These teams train to Eighth Coast Guard District standards and are ready for response to natural disasters like the floods of 1993 and the hurricanes of 2005. The crews for these DARTs are drawn from within each sector and are not held in an SAR readiness posture until called upon by the district.

Another prevalent SAR entity around the Western Rivers is the Coast Guard Auxiliary. The boats and aircraft of the auxiliary are active and engaged in virtually all of the popular recreational boating areas. As along the coasts, they provide significant support to the Coast Guard's SAR mission. They train and qualify to the same standards as their coastal counterparts. In fact, the auxiliary team that won the right to represent the United States at the 2005 international SAR competition was a team from Arkansas (Figure 3).

Additionally, an extensive network of communication towers is in place throughout the Western Rivers. UMIBs are broadcast over this network and "maydays" are received. Each high-level site is connected to one of the three sector command centers, and they are in use 24 hours a day. As in other portions of the country, there



Figure 3: A Coast Guard Jayhawk crew from Mobile, Ala., conducts basket hoist operations with the Coast Guard Auxiliary vessel *Son Seeker*. Coxswain John Donar and crew from the Central Arkansas Flotilla also participated in the search and rescue event. Photo courtesy Mr. Johnny Humphrey.

are communication gaps, particularly in the hilly areas of the Ohio Valley.

As stated in the Coast Guard Addendum to the National SAR Supplement:

"Coast Guard performance of SAR is essentially permissive in nature. Search and Rescue activity may be considered a mandated function, but no specific level of performance has been cited under the legislative authority. Nevertheless, judicial rulings have made it clear that once the Coast Guard undertakes a particular mission, we must conduct that mission with due diligence, we must not worsen a situation by our actions, and we must meet a reasonable standard of performance. Moreover, it is within our service's own code of ethics and our creed to carry out each mission to the best of our ability."

So when a mayday call goes out along the Western Rivers, a Coast Guard command center will kick into action. While the Coast Guard relies heavily upon the great help of many local police and fire departments as well as the towing industry, the job is carried out in the same fashion as SAR all over the country—with due diligence, and to the best of our ability.

About the author:

CDR P.J. Maguire has served in the Coast Guard since graduation from the Coast Guard Academy in 1989. He has served aboard cutters and at shore units. Sector Lower Mississippi River is his first tour in the Western Rivers.



Industrial-Strength SAR

A look at the towing industry and search and rescue.

by CWO FRANZ KARNUTH
Marine Investigator, Sector Upper Mississippi River

Those who sail aboard seagoing vessels must be prepared for any emergency on the open ocean, where immediate emergency services are unavailable. Similarly, inland towing vessels transit long stretches of river where such services are scarce or nonexistent. A few large cities may be able to provide measured response; however, shipboard emergencies require specialized training for responders, and most communities have little capacity for these events.

Out of necessity, towing industry crews have become their own first responders, performing rescues, fighting fires, and providing initial medical treatment. To this end, many companies provide crews with safety training and require participation in drills to hone skills including:

- barge safety,
- river survival,
- fire fighting,
- man overboard rescue,
- abandon ship,
- CPR,
- first aid,
- emergency boat operations,
- life raft usage,
- damage control,
- confined space,
- crew endurance.

Cooperation, meaningful standards (regulated and self-imposed), and skill advancement form the foundation of the towing industry's commitment to safety of life, property, and the environment.

In a hazardous business, where the river stretches thousands of miles, towing crews undoubtedly will face emergency situations. With a culture that promotes safety, they can also have great success, as depicted in the following instances:

- February 2005: During a cold water rescue, the master of the *Pushmahata* single-handedly powered the tow from moorings and "caught" a crewman who had fallen overboard with a mooring line. The crewman sustained only minor injury.
- August 2005: The crews of the *Ergon* and *Big Valley* combined to rescue a man who fell from his fishing boat miles upriver. For hours he floated down the Mississippi River, clinging to a seat cushion in the dark. Fortunately, he was spotted by crew working at a grain facility. They scrambled their vessels and hauled him from the river (Figure 1).
- August 2005: The crew of the *Black Beard*, in cooperation with local and federal government, assisted in the emergency transportation of thousands of Hurricane Katrina victims.

- November 2005: Fire broke out on the harbor tug *Wendy Ann*, with two loaded grain barges in tow. As the fire grew out of control, the crew escaped onto the tow. By the time the crew could get to the other end of the barges, another harbor tug came to assist. A total of three harbor towboats and one line boat aided in rescuing the crew, extinguishing the fire, and saving the vessel.
- January 2007: After a towboat rapidly and unexpectedly sank, two crewmen were rescued by the crew of the motor vessel *Captain O. A. Franks*.
- January 2007: A crewman fell overboard and was drawn under a loaded coal barge by river current. The master of the attending towboat *Elizabeth Brown* used the towboat propulsion system to "wash" the crewman out from under the barge. He then retrieved the man from the river and performed CPR. The crewman was under water for a significant amount of time; however, he was revived and hospitalized for only a few days.



Figure 1: Mariners who made a heroic rescue in the river near Vicksburg, Miss., are awarded public service awards. From left: Capt. Matt Pepper, John Dolan, Capt. Gene Love, and Randy Brown with the man they helped rescue, James McDonald (center). Mr. McDonald is holding the seat cushion that helped save his life. Photo courtesy of the Vicksburg Post.

- April 2007: During a lock transit, a block of six barges broke free with three crewmen on board. In another instance, 25 barges broke free from a tow following an equipment failure and subsequent allision. Towboats *Bruce L. Hahn* and *John Paul Eckstein* provided aid, corralling loose barges and rescuing stranded crewmen.

The people of the towing industry have long proven their vital role as part of the nation's economy and transportation system. With a strong dedication to safety, they have also proven themselves to be reliable and valuable partners in the business of search and rescue.

About the author:
CWO Franz Karnuth is currently stationed at Sector Upper Mississippi River in St. Louis, Mo. He is a marine investigator in the sector's Prevention Department.

Responding to Oil Spills on the Western Rivers

The importance of joint agency cooperation.

by LCDR KATHERINE WEATHERS
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U.S. Coast Guard Sector Upper Mississippi River

ENS AUSTIN CAMPBELL
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Oil spills and hazardous substance releases always have the potential to be dangerous and therefore demand immediate response. But who's in charge of responding? Determining which government agencies have proper jurisdictional authority of the waters before accidents occur is critical to ensuring a timely and coordinated response.

The National Oil and Hazardous Substances Pollution Contingency Plan is the federal government's primary regulatory source for preparing for and responding to oil spills and hazardous substance releases. Per the U.S. Code of Federal Regulations:

"... the purpose of the National Oil and Hazardous Substances Pollution Contingency Plan is to provide the organizational structure and procedures for preparing for and responding to discharges of oil and releases of hazardous substances, pollutants, and contaminants."¹

Coast Guard and EPA Responsibilities

Accordingly, the Coast Guard has jurisdiction for oil discharges within or threatening the coastal zone. The Environmental Protection Agency (EPA) has jurisdiction when it comes to oil discharges into or threatening the inland zone. This distinction creates a unique planning and response structure on the Western Rivers, where the Coast Guard's maritime responsibilities and the EPA's inland jurisdiction meet. Established working relationships between the two agencies are critical to meeting the goals of preparedness, notification, and response.

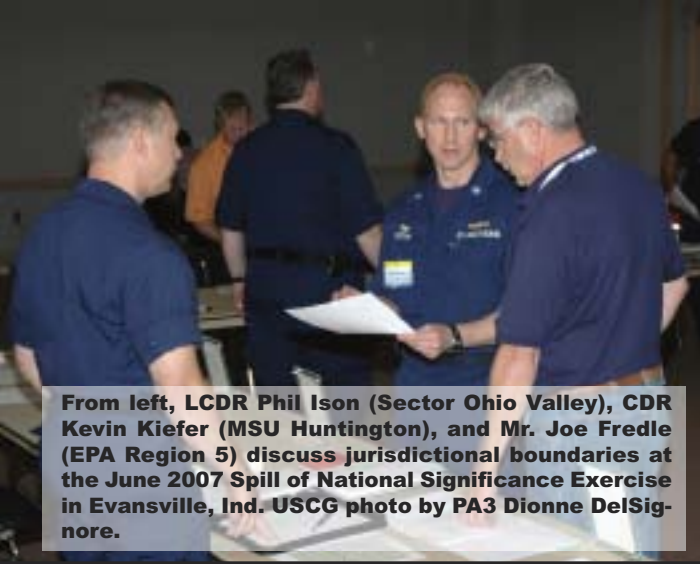
One mechanism used to clarify response protocols on the Western Rivers is a memorandum of understanding (MOU) between the Coast Guard and EPA. Separate MOUs are used for each EPA region that falls within the corresponding Coast Guard district's area of responsibility. The MOUs identify criteria where the Coast Guard will assist the EPA by acting as the lead agency during an oil spill or hazardous substance release response.

Under the agreements, the Coast Guard will act as the lead agency when the incident involves a commercial vessel, vessel transfer operation, marine transportation-related facility, or if the EPA requests it (provided Coast Guard personnel are available to respond). Because the agreements clearly outline the roles of each agency during such emergencies, response personnel can focus immediately on the incident without worrying about overstepping agency boundaries and losing valuable time determining



From left: Mr. Robert Brinck (Caesars Indiana), Mr. Jerry Nauert (Sector Ohio Valley), and ENS Mike Collet (Sector Ohio Valley) review the action plan at the June 2007 Spill of National Significance Exercise in Evansville, Ind. USCG photo by PA3 Dionne DelSignore.





From left, LCDR Phil Ison (Sector Ohio Valley), CDR Kevin Kiefer (MSU Huntington), and Mr. Joe Fredle (EPA Region 5) discuss jurisdictional boundaries at the June 2007 Spill of National Significance Exercise in Evansville, Ind. USCG photo by PA3 Dionne DelSignore.

who has proper jurisdiction.

In addition to the MOUs, other contingency plans exist to provide response and re-

source information to federal, state, and local agencies. Both regional and area contingency plans are developed in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) guidelines, and each is approved by the lead federal agency. Each regional or area contingency plan varies depending on which area of the U.S. it covers. For the Western Rivers, the lead agency for oil pollution response is the EPA. Because of the large area covered by the Western Rivers, sub-area contingency plans have also been developed to provide even greater detail within specific areas.

SONS 2007

Creating the plans helped establish roles and responsibilities for responding agencies during emergencies, but testing them was just as important. The plans and MOUs were tested in June 2007 when the Spill of National Significance (SONS 2007) exercise took place, providing a great opportunity to observe the effectiveness of the plans and amend them where necessary.

A “spill of national significance” is an event that, due to its severity, size, location, actual or potential impact on the public health and welfare or the environment, or the necessary response effort, is so complex that it requires extraordinary coordination of federal, state, local, and responsible party resources to contain and clean up the discharge.² SONS exercises are therefore designed to test (and improve) both the individual preparedness levels of each group as well as their collaborative response efforts.

SONS 2007 was the first to be cosponsored by the Coast Guard and EPA, and involved 11 states, four EPA/Federal Emergency Management Agency regions, more than 20 federal agencies, and numerous private-sector participants. For the Mississippi and Ohio River valleys, the three-day full-scale exercise and three-day long-term response and recovery workshop focused on

issues pertaining to catastrophic oil and hazardous substance releases that would be triggered by a major New Madrid fault earthquake.

The New Madrid fault system is considered the greatest U.S. earthquake risk east of the Rocky Mountains. It lies within the central Mississippi Valley and extends 150 miles from northeast Arkansas to southern Illinois. The fault system is named after the town of New Madrid, Mo., which was the closest settlement to the epicenters of the 1811-1812 earthquakes, when four catastrophic earthquakes occurred during a three-month period.

The SONS 2007 exercise evaluated the coordination among federal, state, and local agencies as they responded to simulated oil spills and hazardous substance releases throughout the area. The exercise proved to be a golden opportunity for all agencies to evaluate their abilities to meet the requirements outlined in the various plans and MOUs. While the SONS 2007 exercise offered the Coast Guard and EPA a chance to focus on their teamwork during an emergency, coordinated response efforts between the two agencies is common on the Western Rivers.

The nature of the Western Rivers amplifies the issues of jurisdictional boundaries. While the Coast Guard does not have MOUs with all of the states along the Western Rivers system, many of the states themselves have mutual aid agreements with each another. Cooperation and agreements among federal, state, and local agencies is critical in successfully responding to emergencies.

About the authors:

LCDR Weathers is chief of Contingency Planning and Force Readiness, Sector Upper Mississippi River, St. Louis, Mo. She enlisted in the Coast Guard in July 1985, completing her four-year enlistment as a 2nd Class Quartermaster. She received a B.A. in philosophy and political science from the University of Missouri–Columbia, and her law degree in 2001 from St. Louis University. She also served tours at Coast Guard District Eight in New Orleans; the Maintenance and Logistics Command, Atlantic in Norfolk, Va.; Coast Guard District Nine in Cleveland, Ohio; the Coast Guard Cutter Gallatin in Governors Island, N.Y.; and Coast Guard Support Center Kodiak, Alaska.

LCDR Stevenson is the former chief of Response, Sector Upper Mississippi River. He enlisted in the Coast Guard, achieving the rank of MKC before receiving his commission in 1995. He subsequently earned his bachelor's degree in industrial technology and his master's in quality systems management. LCDR Stevenson previously served as chief of Marine Environmental Response at Marine Safety Office San Francisco, Calif.

ENS Campbell is currently assigned to Sector Lower Mississippi River. He enlisted in the Coast Guard in 1995, and attended the Aviation Technical Training Center for aviation electronics school in 1997. He served tours at Air Station Borinquen, P.R., and Air Station New Orleans. ENS Campbell received his officer's commission in 2006.

Endnotes:

¹ 40 CFR Part 300.

² 40 CFR Part 300.5

Case Study: Winter Storm on the Lake of the Ozarks, Mo.

The winter of 2006 was a blustery one throughout the Midwest, with devastating snow and ice storms. December 2006 brought devastation to the Lake of the Ozarks, a large vacation resort area located in the heart of Missouri, when the accumulation of 14 inches of snow and ice caved in the roofs of more than 10 marinas and resorts. As a result, an estimated 100 boats were damaged, including 40 that sank at the docks. Damage estimates were placed at hundreds of millions of dollars.

The sunken boats also caused multiple fuel spills. The EPA had jurisdictional responsibility due to the Lake of the Ozarks' inland location, but quickly brought in the Coast Guard and the State of Missouri's Department of Natural Resources (MDNR) for assistance. Coast Guard Sector Upper Mississippi River dispatched personnel to the scene to assess the situation, and together the three agencies were able to mitigate the spills from the sunken recreational boats and provide successful spill response coverage. MDNR took the lead on the spill cleanup and removal of the boats, which continued into March 2007. Although the cost of damage to the boats was high, the total amount of fuel spilled into the lake was less than 100 gallons, due to the quick initial response by the three agencies.

CWO Bullard and BM1 Beadle, MSD Greenville; MSTC Valenti and MST3 Hannan, MSU Baton Rouge; and Vicksburg, Miss. firefighters inspect the damaged barge. USCG photo courtesy of MSD Greenville.



Members of the Vicksburg, Miss., fire department survey the fire damage. USCG photo courtesy of MSD Greenville.



An oil spill response organization barge responds to the incident while the UTV *John Roberts* holds the damaged barge along the bank of the Mississippi River. USCG photo courtesy of MSD Greenville.

Case Study: Vicksburg, Miss. Bridge Incident

On February 1, 2007, the motor vessel *John Roberts* was pushing four Florida marine transportation 5004 barges when one of the barges, carrying about 756,000 gallons of crude oil, struck the Vicksburg, Miss., railroad bridge and burst into flame. The flaming barge broke away and drifted down the Mississippi River about 12 miles until it was pushed against the river bank and the fire was extinguished.

According to LT William Daniels, supervisor of Marine Safety Detachment Greenville, Miss., the Coast Guard was immediately notified along with Mississippi and Louisiana state officials. Coast Guard, state, local, and industry representatives established an incident command post and quickly enacted the MOUs and NCP plans. Because the MOU stated that the Coast Guard is the on-scene coordinator when an actual or potential spill involves a commercial vessel, the Coast Guard assumed the lead role for response efforts.

Bridge traffic was quickly shut down as the barge fire burned off almost 100,000 gallons of crude oil. Numerous agencies immediately started assessments, all working in concert. For example, the Louisiana Department of Environmental Quality (DEQ) responded and coordinated with both the Mississippi DEQ and the Coast Guard to provide assistance. As a result of

the rapid response by the Coast Guard, EPA, state agencies, and industry, the raging fire was brought under control in approximately 11 hours and the Mississippi River was closed only in the area of the incident for one day. There was minimal impact to the Louisiana shoreline.

The pursuing fire consumed most of the crude oil, resulting in the actual recovery of only 200 gallons. Had the crude not burned off, the results might have been

the same as the January 26, 2005 Mid-Valley Pipeline rupture on the Kentucky River. That rupture released more than 83,000 gallons of crude oil, which not only fouled the Kentucky River, but over a 50-mile stretch of shoreline on the Ohio River as well, according to the EPA.

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Reader's Survey

Disaster Assistance and Response Teams

Rescuers on the rivers.



by LT STEVEN PEELISH

Former Chief, Response Department, U.S. Coast Guard Sector Ohio Valley

LCDR JESSE STEVENSON

Chief, Response Department, U.S. Coast Guard Sector Upper Mississippi River

Floods are common in the Midwest. They usually arrive in the spring, when rain and snowmelt fills the minor tributaries that drain into the main river systems. When the soil is so saturated by water that it can't absorb any more, the overflow starts to creep anywhere and everywhere it can.

Levees that surround townships sometimes give way to the massive amount of water looking for the path of least resistance, often causing devastation to anything in its path. This flooding can cause extensive damage to the infrastructure of the impacted area and influence those living and working there. Community utility systems, schools, civil law enforcement capability, medical facilities, and the economy in general can be seriously affected or incapacitated.

Disaster Assistance

The U.S. Coast Guard is always ready to assist in these disasters, and has created a unique team designed to help evacuate families caught in the middle of this devastation. The first of these disaster assistance response teams (DARTs), originally called disaster response units, were created back in the early 1980s to help with these evacuations. The DARTs work with local emergency operations centers to:

- provide search and rescue support,
- transport victims,
- provide essential waterborne logistic support,

- assure delivery of vital supplies and materials,
- maintain access to storm-damaged areas for key response personnel.

DART response on the Western Rivers is an all-inclusive evolution encompassing all aspects of Coast Guard personnel, including active duty, reserves, and auxiliary. Active duty personnel work with reserve and auxiliary members to ensure that continuous training takes place to enable a successful deployment, should the need arise.

Coast Guard members operate 16-foot flood punts, shallow draft flat-bottomed boats that are ideally suited for this kind of work. The DARTs team up with other volunteers and local responders, going house to house, checking for people to evacuate and offering food and water to those who wish to remain in their homes.

The days can be long and the work dangerous. The teams operate in unfavorable weather conditions and uncharted water, most often working in downtown cities with school buses, street signs, tree tops, and other unknown hazards lurking beneath the surface.

Though active and reserve members receive pay for doing this dangerous job, there are members that don't—the auxiliarists. These highly skilled and motivated volunteers assist in Coast Guard flood efforts by conducting over-flight missions, patrolling flood-swollen rivers,



staffing offices, or manning remote communications stations. But for all Coast Guard members, paid or unpaid, the job is about more than just saving lives. It's about humanitarian relief and building a strong rapport with the communities we serve and live in.

Sector Disaster Assistance Response Teams

Thirty boats operated by DART personnel are pre-staged throughout the Western Rivers and can be deployed from Sector Ohio Valley, Sector Lower Mississippi River, and Sector Upper Mississippi River. Whether flood assistance is needed within the Eighth District or in an outlying state, the disaster assistance response teams work seamlessly with all communities throughout the country to accomplish the mission.

Each sector has a primary and secondary area of responsibility from the north and south East Coast, Midwest, and the Gulf Coast. Whenever flooding is anticipated, but has not yet occurred, the DARTs are placed in a standby status. This means that units identify personnel and place them on alert, inventory the equipment and prepare it for transport, and accomplish



A Coast Guard DART convoys to New Orleans for Hurricane Katrina duty. USCG photo by PA1 Charles Bauman.

Floods of National Significance

Coast Guard response to several floods in recent years has resulted in national recognition of DARTs as assets that can cross geographic boundaries to provide flood response. The Western Rivers' floods of 1937, 1993, and 1997 are among the largest seen in recent times, and Coast Guard disaster assistance response team forces responded to them all.

DARTs were also called out to aid efforts in the aftermath of Hurricane Isabelle, which ravaged and isolated portions of the North Carolina Outer Banks in 2003. Disaster assistance response teams also played a critical role in search and rescue efforts during the response to Hurricane Katrina.

The skill and experience of the Western Rivers' Coast Guard forces were put to the test during these hurricane-generated flood responses. On the Western Rivers, response is normally a "surge" operation, as opposed to a continual operation.

Hurricane Katrina would change that process as well as the locations where DARTs are normally deployed from there on out. The disaster assistance response teams were highly successful during the Hurricane Katrina deployment, with members rescuing hundreds of people from their homes, but, as with all incidents, there were lessons learned. These lessons were captured in the rewrite of the Eighth District DART instruction, which discussed issues such as risk, fatigue, training, equipment/personnel to be deployed, and the process by which teams are requested and deployed.

Staying Mission-Ready

Hurricane Katrina also took its toll on the aging 20-year-old fleet of flood punts, so the Eighth District decided to replace them with new, more modern equipment. The new boats, trailers, and engines will be standardized throughout the Coast Guard. The single-



Coast Guard disaster assistance response team members prepare for daily deployment during Hurricane Katrina operations. USCG photo by PA1 Charles Bauman.

any other preparatory measures necessary so the teams can be deployed in a minimum amount of time. Teams are normally deployed via land, with a convoy of support following close behind. If the destination is farther than 12 hours' driving time or floods destroy roads and bridges, thus hindering response times, the Coast Guard coordinates transportation via military aircraft.

axle open trailers currently in use will give way to larger twin-axle ones that are fully enclosed to protect the gear from harsh elements year after year.

The new design of the boats will allow members to efficiently maximize space, store vital gear, and provide a more stable platform. New four-stroke engines will replace outdated two-stroke engines to better align with what the Coast Guard is currently using.

Through the years, disaster assistance response teams have been deployed to various “hot spots” in flooded areas. They have rescued the stranded, evacuated the sick, and delivered water and groceries to diehards who would not leave their homes. They have patrolled homes, farms, neighborhoods, and local businesses, assisting those in need and guarding property from looters. Even in their off time, DART members helped fight back the waters by filling sand bags and pumping water back over the levees.

For the members of the DARTs, these humanitarian efforts are what matter the most. People helping and caring for other people is what it’s all about.

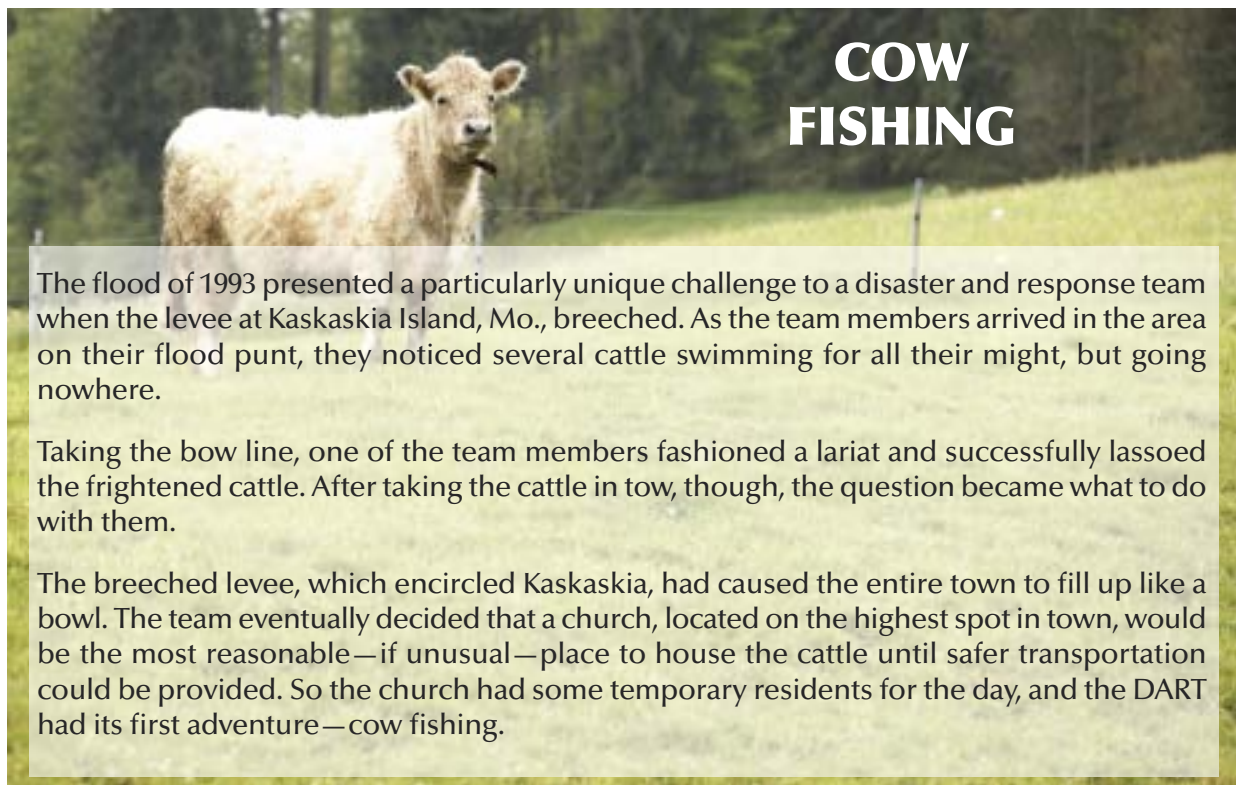
About the authors:

LT Steven Peelish has served in the Coast Guard for 18 years and is a former BM1. With three marine safety office (now marine safety unit) river tours, he has acquired a vast knowledge base of marine safety and security on the Western Rivers. He currently serves in the U.S. Deployable Operations Group, future operations department.



Coast Guard and Army National Guard members go house to house, looking for those in need of assistance following Hurricane Katrina. USCG photo by PA1 Charles Bauman.

LCDR Stevenson has served in the Coast Guard for more than 27 years. He was prior enlisted, obtaining the rank of MKC before his commission. With his diverse background, he has served in many capacities, including aboard three ships, earning his permanent cutterman’s pin.



COW FISHING

The flood of 1993 presented a particularly unique challenge to a disaster and response team when the levee at Kaskaskia Island, Mo., breached. As the team members arrived in the area on their flood punt, they noticed several cattle swimming for all their might, but going nowhere.

Taking the bow line, one of the team members fashioned a lariat and successfully lassoed the frightened cattle. After taking the cattle in tow, though, the question became what to do with them.

The breached levee, which encircled Kaskaskia, had caused the entire town to fill up like a bowl. The team eventually decided that a church, located on the highest spot in town, would be the most reasonable—if unusual—place to house the cattle until safer transportation could be provided. So the church had some temporary residents for the day, and the DART had its first adventure—cow fishing.





River Tenders

Aids to navigation on the Western Rivers.

by LCDR JERRY DAVENPORT

Deputy Commander, U.S. Coast Guard Sector Lower Mississippi River

The Coast Guard's inland river tenders, commonly referred to as WLRs, are conceivably the most unknown and unrecognized part of the organization's afloat community. However, they play a vital role in maintaining safe navigation throughout 14,000 miles of Western Rivers.

The Beginning

The maintenance of aids to marine navigation is one of the oldest federal functions. The responsibility of constructing and maintaining lighthouses was addressed during the first session of Congress, with buoyage of navigable waterways beginning on the Delaware River in 1767. Although the U.S. Lighthouse Service maintained buoys along the Western Rivers into the 20th century, navigation along the Ohio, Missouri, and Mississippi Rivers was restricted to daylight hours because of the hazards associated with navigating the countless river bends, snags (fallen trees), sandbars, and the plethora of other obstructions regularly encountered on the rivers.¹

On July 1, 1939, President Franklin D. Roosevelt transferred the U.S. Lighthouse Service to the Coast Guard, in part because of the nation's ever-growing reliance on the rivers for movement of commerce and the frequent delays associated with low water conditions. Within one year, the first Coast Guard cutter (CGC) *Azalea* was stationed in St. Louis, Mo. The 150-foot cutter was responsible for setting buoys and also made the first attempt at marking a free-flowing stretch of river by assuming responsibility for all aids to navigation (AtoN) from Cairo, Ill., to the confluence at St. Louis and on the Mississippi River from Keokuk, Iowa, to

Alton, Ill.² From this modest beginning, the Coast Guard continuously expanded its presence and is now responsible for maintaining and servicing all AtoN on the Western Rivers.

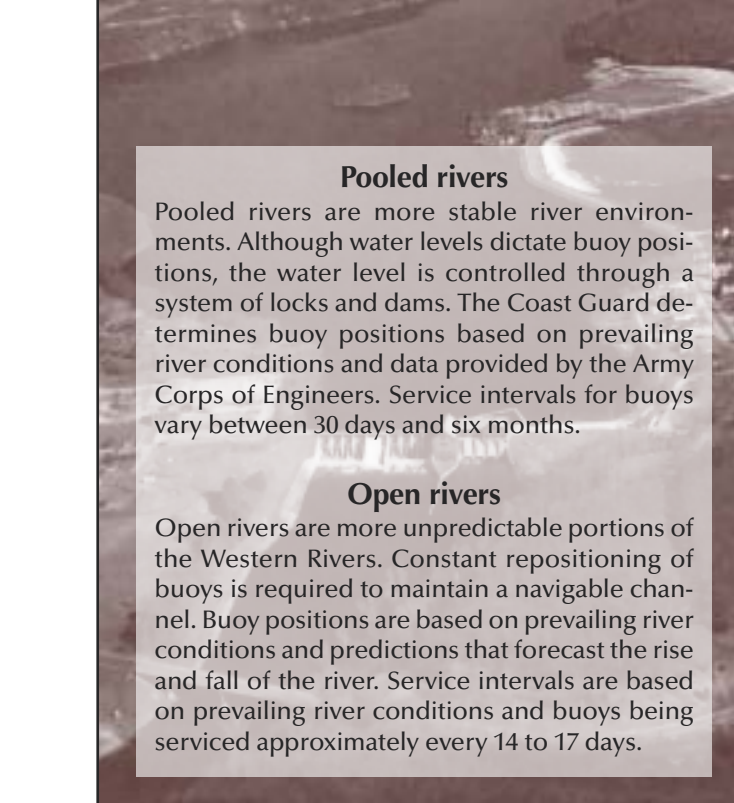
Inland vs. Coastal Aids to Navigation

The number of vessels used to maintain an effective AtoN system throughout the Western Rivers has varied over the years. Today, there are 18 Coast Guard cutters strategically located throughout the Western Rivers (with one assigned to Sector Mobile) to service and maintain the nearly 10,000 buoys and 4,000 fixed shore-side aids that assist



MK1 Benji Mills and SN Trey Cope of USCGC *Osage* replace the mile board at Blake Run Light on the Ohio River. USCG photo by CDR Kevin Kiefer.

rivermen navigating the waters. Aids to navigation are placed at various points along the navigable waterway. The primary function of buoys is to warn rivermen of a danger, obstruction, or change in the contour of the river bottom and delineate the channel, leading to various points, so that dangers may be avoided. Additionally, each buoy serves as a marker and guide to enable rivermen to determine their position in relation



Pooled rivers

Pooled rivers are more stable river environments. Although water levels dictate buoy positions, the water level is controlled through a system of locks and dams. The Coast Guard determines buoy positions based on prevailing river conditions and data provided by the Army Corps of Engineers. Service intervals for buoys vary between 30 days and six months.

Open rivers

Open rivers are more unpredictable portions of the Western Rivers. Constant repositioning of buoys is required to maintain a navigable channel. Buoy positions are based on prevailing river conditions and predictions that forecast the rise and fall of the river. Service intervals are based on prevailing river conditions and buoys being serviced approximately every 14 to 17 days.

to land and hidden dangers, making it possible for vessels to follow the natural and improved channels.

Although each river can be broadly categorized as “pooled” or “open,” each river system is unique and requires a variety of operational standards. For instance, on the pooled Ohio River (which consists of 20 pools created by locks and dams), buoys are positioned using smaller river-type buoys (called 6th class buoys), with moorings usually consisting of 1/2-inch chain and 1,500-lb. sinkers (anchors that keep the buoys in place). On other pooled rivers, buoys may be positioned using moorings of wire rope with concrete sinkers, or they may be jetted or pushed into the river bottom. Furthermore, on open rivers like the lower Mississippi River, larger river-type buoys (called 4th class buoys) with 3/8-inch wire rope and 1,500-lb. sinkers are used.

While the mission of both inland and coastal AtoN units are basically the same, the process is extremely different. Both coastal and inland waterways are marked for safe navigation by the lateral system of buoyage—a simple arrangement of colors, shapes, numbers, and light characteristics show the side on which a buoy should be passed when proceeding in a given direction. All buoys are marked with radar reflectors.

Coastal buoy tenders have transitioned to the use of differential global positioning systems for setting buoys and use a very precise automated aid positioning system software program to calculate and record locations of buoys with assigned positions. Inland river tenders operate on the extreme outer limits of a channel to mark

the maximum safe navigational channel, considering channel alignment, prevailing river stage, and obstructions.

Inland river tenders determine the best navigable channel by using a depth finder to ascertain the channel and surveys provided by the Army Corps of Engineers. Because of the dynamic, ever-changing, and unpredictable environmental conditions associated with the Western Rivers, buoys are not assigned positions. Therefore, the location and number of buoys identified on inland river charts are approximate and do not necessarily reflect the current AtoN system.

One of the most notable differences is that Western River buoys and day boards (one kind of fixed shore-side aid) are not numbered like they are in coastal regions. In coastal regions, the buoys and day boards are numbered to correspond to the buoys and day boards numbered on the charts in that assigned position. Since the river buoys and day boards don't have assigned positions, they are not numbered. However, the river fixed shoreside aids (day boards and lights) have placards or “mile boards” to help show the river mile location.

Typically, a coastal buoy tender might work five buoys a day, with each buoy taking up to two hours to service. It takes longer to determine the assigned positions

Comparing coastal and inland river buoy operations is a lot like comparing apples to oranges—while both are fruit, they taste completely different. The same is true for coastal and inland buoy operations. While both are required to ensure safe navigation, one is not harder than the other; they are just different—and equally important.

of the aids, and the buoys are usually larger, making them more difficult to handle. An inland river tender can service a significantly larger number of buoys a day—perhaps up to 100—spending only a couple of minutes on each aid, verifying that a buoy's last position still marks the navigable channel, replacing missing buoys, or resetting the channel. A typical day for an inland river tender consists of replacing or repairing numerous buoys and making frequent stops to maintain and service fixed shore aids along its area of responsibility. This includes rebuilding structures,



replacing batteries, changing lanterns and lights, and cutting weeds and overgrown vegetation that obstruct fixed shoreside aids.

Unique Hazards

Unfortunately, there are numerous hazards associated with maintaining shoreside aids throughout the Western Rivers. Each summer, crewmembers get painful insect bites from hornets, yellow jackets, and wasps, and they are persistently plagued with poison ivy or sumac. It is not uncommon for crewmembers to require immediate medical attention because of an allergic reaction, or because a rash erupts and develops into large, weeping blisters.

Every year, a number of associated injuries result in the loss of hundreds of man-hours. Furthermore, the Western Rivers contain several different habitats and ecosystems that house dangerous animals including alligators, copperhead snakes, rattlesnakes, and other wild animals. Crewmembers routinely encounter these creatures while maintaining shoreside aids, and it is regular practice in some areas for an independent watchstander to be assigned lookout responsibilities to ensure crew safety.

Another common hazard faced is the extreme weather conditions. Heat stroke is a significant concern, as the southernmost regions of the Western Rivers typically exceed temperatures of 100 degrees Fahrenheit, with a significantly higher heat index temperature during the summer months. Given the amount of personal protective equipment worn while servicing shoreside aids,



Crew aboard the USCGC *Kanawha* set a buoy on the Mississippi River. The *Kanawha* crew is responsible for 425 floating navigational aids and more than 90 shore aids. USCG photo.

crewmembers must take extra precautions to prevent the elevated metabolic temperatures caused by a combination of workload and environmental heat load that can cause heat stroke. There are also hazards created by extreme cold weather in the northern portions of the Western Rivers, where icy conditions make buoy deck evolutions much more hazardous and the cold temperatures create equally dangerous conditions.

Multimission Platform

In addition to its primary AtoN responsibility, each inland river tender is also a disaster response and homeland security platform. For example, three inland river tenders actively participated in the disaster response efforts following the destructive landfall of Hurricanes Katrina and Rita.

Coast Guard cutters *Greenbrier*, *Muskingum*, and *Wedge* were deployed to the Gulf Coast to facilitate the expedited restoration of the devastated AtoN system on the lower Mississippi River. This drastically reduced the economic

impact associated with the costliest natural disaster in United States history. Four of the other inland river tenders, CGC *Kankakee*, CGC *Kanawha*, CGC *Chena*, and CGC *Ouachita*, covered for these vessels while they were deployed to the Gulf Coast.

Additionally, all three deployed inland river tenders



The USCGC *Kanawha*, a 75-foot river tender, is one of 18 Eighth District inland river tenders and services more than 150 miles of the Arkansas, White, and Mississippi River systems. USCG photo.

resupplied numerous Eighth Coast Guard District AtoN units with the critical equipment and supplies necessary to fix shoreside aids and open commercial navigation following Hurricane Rita.

It is common practice for inland river tenders to serve as command platforms for high-optempo regattas, including Thunder Over Louisville, the Three Rivers Regatta (Pittsburgh, Pa.), and Cincinnati's Riverfest fireworks. In this capacity, the cutter serves as the command and control platform, providing vital communication links among the multiple federal, state, and local agencies participating in these events.

Additionally, CGC *Obion* has served as the command platform for several joint agency recreational boating safety operations where the Coast Guard teams with state and local resources to conduct recreational vessel boardings and advocate safety through the distribution of educational literature. Furthermore, the CGC *Muskingum* served as the command platform for the Clinton Presidential Library dedication ceremony, ensuring protection to every living president and countless heads of state, dignitaries, and guests.

Within the homeland security mission area, every time an inland river tender gets underway, it is conducting a maritime domain awareness patrol. Aboard armed vessels capable of protecting valuable waterways assets, the river tender crews constantly analyze the surroundings with an emphasis on understanding all elements of the maritime environment that could impact security, safety, or the economy of the United States.

An Aging Fleet

The majority of inland river tenders are 40-plus years old. This represents the oldest class of vessels in the Coast Guard without a funded mid-life refurbishment or recapitalization program in place. Over the last several years, the number of catastrophic machinery failures has increased tremendously. It has also become increasingly difficult to find replacement parts to effect timely repairs. Numerous parts are no longer manufactured and must be fabricated. This leads to additional costs and extended repair times, thereby placing greater stress on the remaining fleet that must spend more operational hours underway to ensure service intervals are met and waterways are properly marked.

Additionally, there is an ever-growing need for technological upgrades on each cutter. All 18 inland river tenders recently received new navigational programs with electronic charting system and automatic infor-

mation system capabilities. The program is now compatible with Army Corps of Engineering surveying equipment and should lead to more effective ways of marking and maintaining an inland river AtoN system.

Although some progress has been made over the years, the inland river tenders need to be updated and replaced. Coast Guard Commandant Thad Allen has noted that this is one of his top priorities. Currently, no inland river tender has underway connectivity, meaning that the crew must wait until they return to home-



DC2 Patrick Moran conducts maintenance aboard the USCGC Kanawha. USCG photo.

port to accomplish many of their administrative and operational responsibilities—including the transmission of the most recent buoy positions.

The Coast Guard has recognized many of the challenges associated with the existing inland river tender fleet. In fact, the organization has chartered several natural working groups to address many of these issues. Several groups are focused on providing the most fruitful short-term options to bridge maintenance gaps and extend the lifespan of the existing 18 cutters. Other groups are looking at long-term solutions. One can be assured that these groups are committed to ensuring continued availability of inland river tenders and timely maintenance of the navigational system until a long-term solution is achieved.

About the author:

LCDR Jerry Davenport has served in the Coast Guard since 1980. He has served various cutters and shore units and has 13 years of experience at units within the Western Rivers.

Endnotes:

- ¹ Douglas Peterson, "United States Lighthouse Service Tenders: 1840-1939," Annapolis & Trappe, Maryland, Eastwind Publishing, 2000.
- ² Robert Scheina, "Coast Guard Cutters and Craft, 1946-1990," Annapolis, Naval Institute Press, 1990.



Promoting Safe Operations

Recreational boating on the Western Rivers.



by LT STEVEN PEELISH

Former Chief, Response Department, U.S. Coast Guard Sector Ohio Valley

LTJG BRANDON GULDSETH

Enforcement Division Supervisor, U.S. Coast Guard Sector Upper Mississippi River

LT MICHAEL ANDERSON

Chief, Response Department, U.S. Coast Guard Marine Safety Unit Pittsburgh

Although the majority of recreational boating safety enforcement is covered by the state governments, the U.S. Coast Guard remains an active partner for all recreational boating safety on the Western Rivers system. From fielding search and rescue (SAR) calls to providing boating safety instruction to civilians through the Coast Guard Auxiliary, the Coast Guard continually strives to ensure that the boating public is well-informed and protected in this ever-changing and unique environment.

Teamwork

Due to its limited resources, the Coast Guard on the Western Rivers has a special working relationship with other government agencies, civilian police, and fire departments when conducting SAR operations. In such situations, if a Coast Guard vessel is not in the area at the time (which is more often than not the case), the centrally located sector communication centers will notify the nearest civilian resource to the vessel in distress and ask if it is available to respond.

The Coast Guard Auxiliary is also tasked with SAR when active duty Coast Guard personnel are not available to respond. Some of the typical search and rescue cases on the rivers include persons in the water, engine failure, boat fires, and overdue vessels.

Law Enforcement Efforts

One of the major “hot spots” along the Missouri River is the Lake of the Ozarks. It is a 54,000-acre lake with more than 1,150 miles of shoreline, and is considered

one of the most dangerous recreational boating locations in the United States. For example, ten people perished there between May and August 2006.¹

Due to the numerous accidents, Coast Guard Sector Upper Mississippi River; District Eight’s boating safety and security team, operated by Sector Ohio Valley; and the Missouri state water patrol conducted a joint Labor Day surge operation from September 2-3, 2006, at the Lake of the Ozarks. Sector Upper Mississippi River and Sector Ohio Valley each provided a 23-foot Safeboat and law enforcement crew; Missouri state water patrol provided 16 officers and 16 boats.

During the weekend, the Coast Guard made more than 500 civilian boating contacts. These efforts influenced boating safety and directly contributed to a marked reduction in boating mishaps. There were no fatalities and minimal search and rescue cases and injuries during this two-day period. The boating public’s response was extremely positive, as indicated by the overwhelming number of positive comments and appreciation expressed for the overall law enforcement presence. We intend to conduct similar operations in the future at these types of holiday events.

Casualties

Inevitably, however, accidents happen when they are least expected. For example, in Marine Safety Unit Pittsburgh’s area of responsibility, 2006 was perhaps one of the worst on record, with four recorded boat fatalities.² These four individuals lost their lives in two

separate accidents. Both accidents coincidentally occurred at lock and dam facilities, which pose unique concerns for recreational boaters on the Western Rivers.

On July 1, 2006, a recreational boat piloted by an experienced operator with seven others on board was transiting downbound on the Allegheny River, toward Pittsburgh, above Lock and Dam Number Two. Instead of heading toward the lock, the



Boating safety and security team members terminate a voyage on Kentucky Lake, Ky., due to overloading and a lack of personal flotation devices. USCG photo by AN Manter.

boat went over the 12-foot tall dam at full throttle. The boat landed right-side-up below the dam, but was sucked back toward it by fast-moving hydraulic currents. The craft began to take on water and capsized. The operator was thrown overboard and drowned. After the boat capsized, three passengers in the water were picked up by a recreational boat nearby. Three others caught ropes thrown by lock operators and were pulled up the lock wall to safety. One individual was found deceased two days later, approximately one mile downriver of the lock and dam. As of this writing, the cause of the incident is still under investigation.

On September 24, 2006, a recreational boat with three individuals on board got underway near the town of Industry, Pa. According to the only survivor of the incident, he and his two friends had finished watching a Pittsburgh Steelers football game and loaded up coolers of beer. As they were downbound on the Ohio River, the operator indicated that he thought the Montgomery Lock and Dam structure was a bridge. They continued moving at a high rate of speed toward the dam until suddenly impacting the gate structure below the waterline. Officials from the Pennsylvania Fish and Boat Commission found alcohol on the boat and confirmed that the boaters were drinking.

Another major concern for recreational boaters and commercial vessel operators alike on the Western Rivers is close proximity. On August 25, 2005, a houseboat operating in Cincinnati, Ohio, at night with no navigation lights, was struck by a towboat, killing four people. LT Mike Fields, of the Kentucky Department of Fish and Wildlife, states, "It's common for recreational boats to get into trouble on the Ohio River with commercial barge traffic. In an urban environment, large vessels tend to blend in with the surrounding area. Due to the slow, steady movement of the barges, it can be

difficult to notice them—particularly at night. In the Cincinnati area, barge lights are difficult to distinguish, due to background lighting from the city."

Boating Safety and Security Team

Though not always a factor in deaths, in most recreational boating fatalities throughout the Western Rivers, people who were killed were not wearing life jackets. To promote boating safety on the Western Rivers, Mr. Kevin

Kelly, District Eight's recreational boating safety manager, created the boating safety and security team (BSST).

In 2001, District Eight received a grant for \$190,000 to fund the team. Mr. Kelly purchased a vessel from



Boating safety and security team supervisor and boarding officer DCC Robert Davis conducts a field sobriety test. USCG photo by AN Manter.

Safeboat, outfitted it, and began conducting boardings throughout the district. The BSST travels throughout District Eight's area of responsibility, conducting vessel boating safety boardings on recreational boats. "Since the Coast Guard doesn't have small boat stations on the inland waterways, the BSST is the next best thing," says LT Steve Peelish, the boating safety and security team coordinator.

The boating safety and security team was eventually relocated to Sector Ohio Valley in Louisville, Ky., from its previous location in Parris Landing, Tenn. The team operates a 23-foot Safeboat and is comprised of a group of selected Coast Guard Reserve members with law enforcement backgrounds. The chief of the Response De-





The boating safety and security team conducts a recreational safety boarding on a pontoon boat on Kentucky Lake, Ky. USCG photo by AN Manter.

partment at Sector Ohio Valley is charged with coordinating its missions and developing a workable operations plan with other sector units within District Eight. The BSST plans to conduct operations soon in Texas, Missouri, Tennessee, Kentucky, and Alabama.

The BSST performs approximately five to eight missions per year during the busiest holiday seasons like the Fourth of July, Memorial Day, and Labor Day weekends. While the Coast Guard isn't usually present in areas like Lake Cumberland, Ky.; Lake of the Ozarks, Mo.; and Dale Hollow Lake, Tenn.; due to geographic reasons, the boating safety and security team still has the jurisdiction to conduct boardings. "It is an odd thing for the public to see the Coast Guard out on these lakes and rivers, but a welcomed sight nonetheless," says Petty Officer Joe Cline, the BSST coxswain. "The public doesn't know what to think when we pull them over to conduct a CG-4100 safety check on their vessel." The boating safety and security team offers this assistance to other government agencies because the number of recreational boaters usually reaches into the thousands.

Sector Ohio Valley's field intelligence support team, which pre-deploys to a location and meets with the local law enforcement agency, is also a welcomed resource. The field intelligence support team gains valuable insight into the trouble spots, develops a geographic partnership, and plans out the best place to be plugged into the boating safety operation. This effort helps locals to target boating safety patrols and provides an additional federal resource for boating under the influence enforcement.

Along with the above missions, the BSST has been successful in search and rescue efforts and public safe boating awareness. It even aided the Kentucky Fish and Wildlife Services to hunt for a fugitive wanted for wanton endangerment of one of their officers. In 2006, the BSST successfully completed 85 safety boardings, conducted 102 spot checks, and provided recreational boating safety tips and America's Waterways Watch information, educating 815 individuals on safe boating practices and proper procedures for reporting suspicious activities.³

About the authors:

LT Steven Peelish has served in the Coast Guard for 18 years and is a former BM1. With three marine safety office (now marine safety unit) river tours, he has acquired a vast knowledge base of marine safety and security on the Western Rivers. He currently serves in the U.S. Deployable Operations Group, future operations department.

LTJG Brandon Guldseth has served both in the Air National Guard and the Coast Guard for 10 years. During that time he has operated ground radars to train Air Force fighter pilots to evade surface-to-air missiles and weapons systems. He has piloted small boats in the U.S. Coast Guard for search and rescue and law enforcement and is currently completing his tour with Sector Upper Mississippi River as the enforcement division supervisor on his way to attending naval aviation training in Pensacola, Fla.

LT Michael Anderson has served in the Coast Guard for 19 years. He served as a helicopter rescue swimmer prior to attending Officer Candidate School in 1998. Since completing OCS, he has completed a joint staff and two tours in the marine safety field. He holds a master of science degree in business ethics from Duquesne University.

Endnotes:

- ¹ Marine Information for Safety and Law Enforcement database, <http://mislenet.osc.uscg.mil/>.
- ² Pennsylvania Fish and Boat Commission, <http://www.fish.state.pa.us/mpagl.htm>.
- ³ Marine Information for Safety and Law Enforcement database, <http://mislenet.osc.uscg.mil/>.

Auxiliarists

Established in 1939, the auxiliary assists the Coast Guard as a force multiplier. The auxiliary's 35,000-plus members are drawn together by their love of the water and a willingness to serve other boaters. Members also receive special training so that they may be a functional part of Team Coast Guard, a role which continues to grow as the Coast Guard expands its homeland security mission.

Auxiliarists assist the Coast Guard in non-law enforcement programs, such as public education, vessel safety checks, safety patrols, and search and rescue.

Auxiliarists volunteer more than 2,000,000 hours annually to benefit other boaters and their families. They also provide direct operational and administrative support to many local Coast Guard units.

On the water, auxiliary vessels completing missions for the Coast Guard are marked with patrol signboards bearing the red slash of the Coast Guard. So equipped, these vessels become Coast Guard vessels and are no longer civilian boats. Their crews are trained to rigorous Coast Guard Auxiliary standards, and are prepared to meet the challenges of a variety of marine situations, including emergencies.

The safety patrols directly support the Coast Guard's maritime safety responsibilities and provide important visual benefits to the public as well. When the public sees a Coast Guard vessel underway, they know that distress assistance is available. The auxiliary is also a great force multiplier that provides not only on-water crowd control and spectator safety during regattas and other marine events, but also opportunities for the public to obtain boating safety information.

Even at the dock, one may spot an auxiliarist performing his or her duties. The auxiliary performs vessel safety checks to help achieve voluntary compliance with recreational boating safety laws, particularly regarding safety equipment. The vessel safety checks help heighten awareness of critical safety issues through one-on-one contact with a trained Coast Guard Auxiliary vessel examiner. A "seal of safety" decal is awarded upon successful completion of the vessel safety check, and attests that the vessel is in compliance with boating requirements.

When not near the water, auxiliarists provide boating safety classes, fostering a wider knowledge of— and better compliance with—the laws, rules, and regulations governing the operation of recreational vessels.



A Coast Guard Auxiliary member checks a child's personal flotation device while conducting dockside boating safety checks. USCG photo.



A Coast Guard Auxiliary member awards a "seal of safety" decal. USCG photo.



Guardians of the Western Rivers

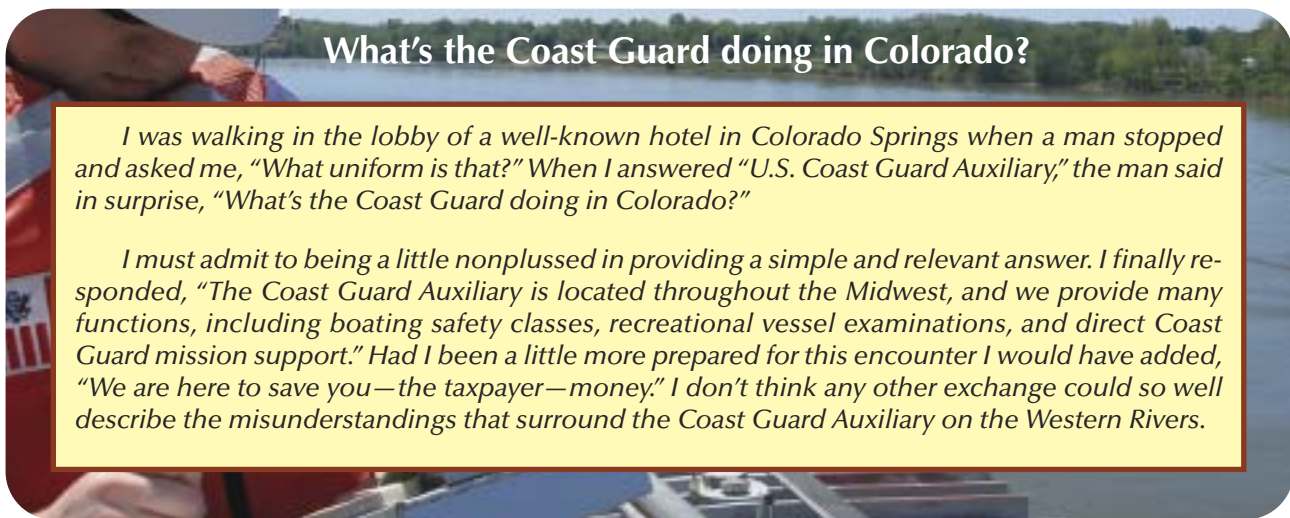
The Coast Guard Auxiliary's Eighth Western Rivers Region.

by MR. MARVIN BUTCHER

Auxiliary Coordinator, U.S. Coast Guard Sector Upper Mississippi River

MR. JOHN DONAR

Auxiliary Coordinator, U.S. Coast Guard Sector Lower Mississippi River



What's the Coast Guard doing in Colorado?

I was walking in the lobby of a well-known hotel in Colorado Springs when a man stopped and asked me, "What uniform is that?" When I answered "U.S. Coast Guard Auxiliary," the man said in surprise, "What's the Coast Guard doing in Colorado?"

I must admit to being a little nonplussed in providing a simple and relevant answer. I finally responded, "The Coast Guard Auxiliary is located throughout the Midwest, and we provide many functions, including boating safety classes, recreational vessel examinations, and direct Coast Guard mission support." Had I been a little more prepared for this encounter I would have added, "We are here to save you—the taxpayer—money." I don't think any other exchange could so well describe the misunderstandings that surround the Coast Guard Auxiliary on the Western Rivers.

Area of Responsibility

What, indeed, are we doing in Arkansas, Colorado, Illinois, Iowa, Kansas, Louisiana, Minnesota, Mississippi, Missouri, Nebraska, North Dakota, Oklahoma, South Dakota, Tennessee, Wisconsin, and Wyoming? This is the area of responsibility (AOR) of the Eighth Western Rivers Region of the U.S. Coast Guard Auxiliary. It is easily the auxiliary's largest geographic region, which is perhaps surprising, since it is entirely landlocked and there are no ocean coastlines even bordering this area.

Many people don't think of the Midwest as having any shoreline or water, but they could not be more mistaken. A quick look at a map illustrates that the Midwest possesses several large rivers, including the Missouri River, upper Mississippi River, and Arkansas River. Together these rivers provide drainage for more than 1,300,000 square miles of the U.S. Within the

Eighth Western Rivers Auxiliary, there are over 4,200 miles of navigable waters, more than 1,800 miles of tributary waterways, 62 locks and dams, six major commercial ports, and 422 bridges.¹ This is a significant section of waterway for the Coast Guard to oversee. If one judges these rivers on economic impact alone, their importance is obvious, with 60 percent of all grain exports flowing down the Mississippi River, along with 4.5 billion dollars of goods and products.²

The Eighth Western Rivers region is one of three auxiliary regions (Coastal and Eastern being the other two) attached to the Eighth Coast Guard District. Auxiliary flotillas and divisions are organized in districts comparable to the Coast Guard districts and are assigned the same district number. A flotilla is the basic organizational unit of the auxiliary and comprised of at least 15 qualified members who carry out auxiliary program ac-



Locations of divisions and flotillas.

tivities. Every U.S. Coast Guard Auxiliarist is a member of a local flotilla. Flotillas in the same general geographic area are grouped into divisions. Each division usually consists of five or more flotillas.

This Eighth Western Rivers region area of responsibility overlays two U.S. Coast Guard sectors: Upper Mississippi River (SUMR), headquartered in St. Louis, Mo.; and Lower Mississippi River (SLMR), headquartered in Memphis, Tenn. Within this area of responsibility there are no Coast Guard operating bases, no Coast Guard air stations, and, for that matter, no dedicated Coast Guard air assets.

The active and reserve Coast Guard forces rely heavily on the auxiliary to perform the maritime domain awareness patrols that would normally be carried out by active forces in coastal regions. When reviewing the Eighth Western Rivers region, it is apparent that its assets are important to completing many Coast Guard missions. The auxiliary assets in this AOR include a membership of 1,300 auxiliarists who provide 136 radio facilities, 217 boating facilities, and six aviation facilities.³ All Coast Guard aviation assets in this AOR are auxiliary air; that, in itself, is a vital contribution to active Coast Guard forces.⁴

The auxiliarists of the Western Rivers are dedicated to the Coast Guard's missions. They have to be—just to get to the meetings! To provide some idea as to the distances involved in performing common functions, one need only look at a representative division. Most of the divisions in the Western Rivers region meet four times a year. These are generally three-day events. It is not uncommon for auxiliarists to drive hundreds of miles to attend the division meetings. In fact, there are many auxiliarists who drive hundreds of miles just to attend flotilla meetings.

Functions

The Western Rivers Auxiliary performs many of the same functions that its coastal brethren do. It conducts recreational boating safety missions, boating safety patrols, air patrols, radio missions, and provides direct support to SUMR and SLMR. Admittedly, many of these patrols are more than 800–1000 miles from their “local” sector command center, which makes for some unique communications issues. Some of these patrols require hard-line telephone communications to commence the patrol and to terminate them, so there are no direct communications between the vessel/aircraft and the sector command center during the patrols.

Due to the distances involved in performing many standard missions and the relatively small size of the active duty and reserve forces assigned to the Midwest, it has become commonplace for auxiliarists to be



Aboard the auxiliary facility *Son Seeker* are (left to right): Mel Otts; Johnny Humphries; CWO Mark Helmers, operation training officer; Jerry Geddes; and John Donar, coxswain. Photo courtesy of Mr. Bob Donaldson, auxiliarist.

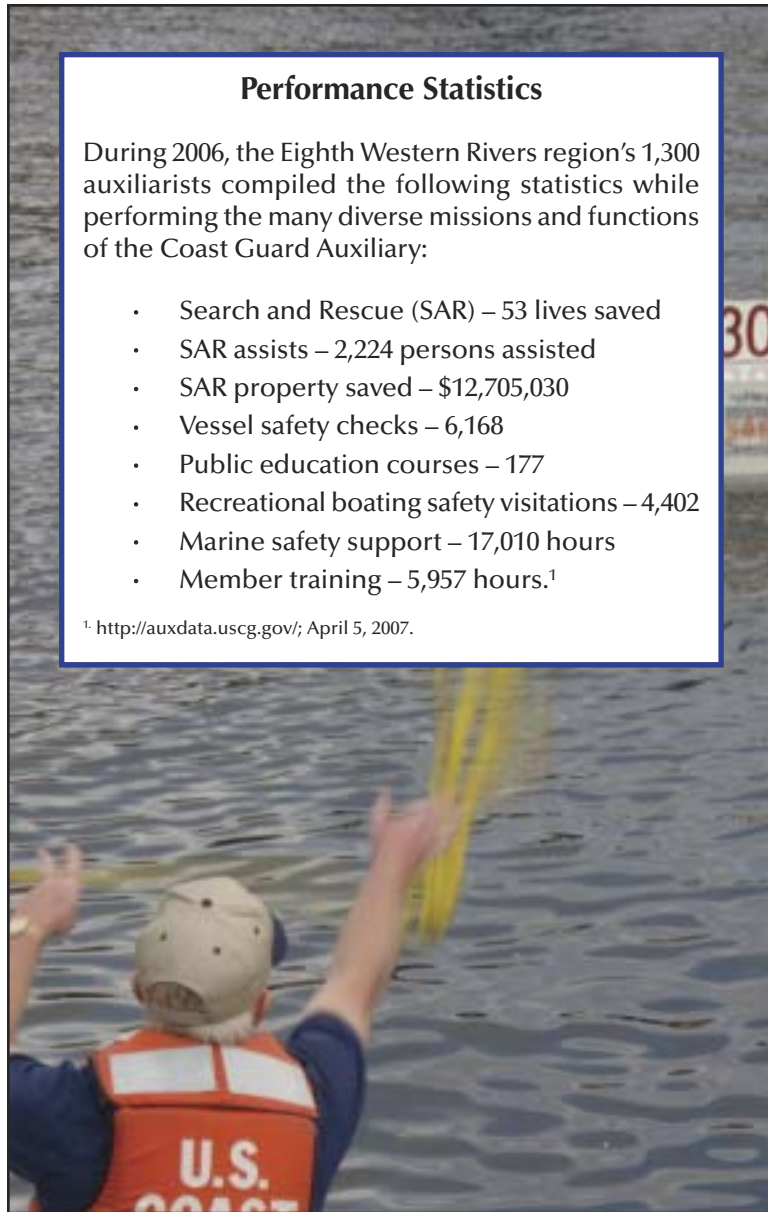


Performance Statistics

During 2006, the Eighth Western Rivers region's 1,300 auxiliaries compiled the following statistics while performing the many diverse missions and functions of the Coast Guard Auxiliary:

- Search and Rescue (SAR) – 53 lives saved
- SAR assists – 2,224 persons assisted
- SAR property saved – \$12,705,030
- Vessel safety checks – 6,168
- Public education courses – 177
- Recreational boating safety visitations – 4,402
- Marine safety support – 17,010 hours
- Member training – 5,957 hours.¹

¹ <http://auxdata.uscg.gov/>; April 5, 2007.



U.S. Coast Guard Auxiliary Gary Derby throws a heaving line during an event at the 2006 International Search and Rescue Competition. USCG photo by PA3 Kip Wadlow.

trained in inspections and investigations to assist active duty forces. For example, when vessel examinations are conducted in the Lake of the Ozarks, Mo., region, generally one active Coast Guard inspector will travel to this area and meet up with three auxiliaries who have been trained as inspectors. This team will then conduct all the examinations necessary. This requires fewer active duty inspectors to perform these missions, thus permitting them to be assigned to other inspections duties. It also reduces travel costs associated with temporary assignments of active duty and reserve forces, thus stretching scarce travel funds and enabling the commands to perform more missions.

Remote Customer Service Support Offices

Within this framework, the Eighth Western Rivers region has developed one of its most important projects: a pilot program that provides direct support to the Regional Examination Centers (RECs) in Memphis, Tenn., and St. Louis, Mo. In order for mariners to obtain licenses and documents from the RECs, many must travel hundreds of miles and incur significant personal costs.

Although the merchant mariner licensing and documentation programs are in transition, the RECs will remain as the face of the Coast Guard to all mariners.⁵ Since August 2006, U.S. Coast Guard Auxiliaries have been volunteering to help with this special pilot program to provide support to the RECs. Initially, 23 auxiliaries were selected and trained. While six were assigned to work in the main office of the RECs, the remaining auxiliaries were assigned to work in remote customer assistance offices. Presently, four offices have been established in St. Paul, Minn.; Branson, Mo.; the Kansas City metropolitan area; and Denver, Colo. These offices are indeed remote—the closest remote office is 135 miles from REC St. Louis, and the farthest is more than 900 miles away.

The most interesting feature of this program is that all the remote customer assistance offices are manned entirely by auxiliaries. The program is designed to provide customer service to remote areas, where many mariners live and work. While these offices are not full-service RECs, they provide functions such as ensuring that:

- an application for license or document is acceptable,
- citizenship and resident alien documents are correct and copied with the application,
- all applicants are fingerprinted,
- all applications are forwarded to the RECs.

Each office also has an auxiliary designated as a Coast Guard official capable of administering the oaths required by the National Maritime Center.

The auxiliaries in this program receive specialized training to perform these functions. Most importantly, they receive training in forensic document examination from a special agent (certified trainer) of the Immigration and Customs Enforcement Agency. This permits them to examine citizenship and resident alien documents that mariners must provide as a part of their application package. They also had to become certified as fingerprint technicians. Finally, all received instruction

in REC procedures and a familiarization for the entire REC process.

Of course, if examinations are involved, it is necessary for the applicant to travel to one of the RECs, but this is still a real savings to the applicants because they do not have to make repeated trips to Memphis or St. Louis. As this program develops, further services will be added.

Support Opportunities

Auxiliarists have been trained by the Coast Guard to augment crew and communication watchstander positions. This allows active duty personnel to take a break or to be assigned to other duties. Since Coast Guard Auxiliary members usually stay in one location for a considerable time, they fill roles as trainers in Coast Guard-mandated training, such as team coordination training. Using auxiliarists, the commands can count on someone being available to provide training when needed.

Another major Coast Guard command within the Eighth Western Rivers AOR is the Integrated Support Command in St. Louis, Mo. This command provides support to all Coast Guard commands in the Midwest. The Eighth Western Rivers region's first major project for the command involved assisting in the basic allowance for housing surveys at areas hundreds of miles from the Integrated Support Command. These surveys require approximately 150 man hours of survey work for each locale.

In an area where most waterways and lakes are owned by other federal agencies and state entities, it is necessary to negotiate access to these bodies of waters. One of the primary partners of the Western Rivers Auxiliarists is the U.S. Army Corps of Engineers (USACE). In this area of responsibility, each flotilla and division develops a solid working relationship with the local USACE district. This is a win-win situation for all involved. USACE receives experts who can perform vessel safety examinations, boating safety educators who can conduct boating safety courses, and qualified crews who can perform safety patrols.

One example of this partnership was the boat races held at a USACE lake in Arkansas in April 2007. Though the lake is considered federal waters, the Coast Guard does not have jurisdiction because it is not com-

mercially navigable. With an anticipated spectator fleet of more than 1,000 pleasure boaters, USACE requested auxiliary presence early in its planning cycle. The Eighth Western Rivers region provided 12 surface assets for this event. These assets maintained a safety zone that included 6.5 miles of race course. This was particularly challenging, since the race crafts were ocean-size racers, capable of speeds approaching 200 miles per hour. Safety for the spectators and the racers was paramount.

As can be seen, the Western Rivers AOR is quite unique. It is a vast geographic area, sparsely populated, but containing large rivers. Despite the challenge of geography, the Coast Guard Auxiliary of the Western Rivers region performs not only the standard functions of the auxiliary—including addressing the needs of the boating public—but several unique ones as well.

Additionally, the Eighth Western Rivers region focuses its scarce resources in direct support to Coast Guard forces, enabling Coast Guard active duty and reserve forces to undertake additional missions and duties that could

otherwise not be accomplished due to their limited numbers. The motto of the Eighth Western Rivers region is "Guardians of the Western Rivers." Its members believe in this motto and are not only willing to perform whatever duty called upon to assist their fellow citizens, but are proud to do so.

About the authors:

Mr. Marvin Butcher served 27 years in the U.S. Navy, where he commanded several warships before retiring at the rank of captain. He then served as a merchant marine master of a U.S. Navy special mission ship. Mr. Butcher was named the U.S. Coast Guard Auxiliarist of the Year for 2006.

Mr. John L. Donar was born and raised in Binghamton, N.Y. He has an extensive business management background and is a U.S. Army veteran. Mr. Donar joined the Coast Guard Auxiliary in 1989 and has held numerous elected and appointed positions, currently serving as a qualification examiner and coordinator to Sector Lower Mississippi River and the Arkansas boating law administrator representative.

Endnotes:

- ¹ USCG Sector UMR/LMR briefs dated January 2007 to VADM Papp, <http://www.mvn.usace.army.mil/pao/bro/misstrib.htm>, <http://www2.mvr.usace.army.mil/UMRS/NESP/>, <http://www.hq.usace.army.mil/cepa/pubs/feb00/story11.htm>.
- ² USCG Sector UMR brief dated 5 September 2006 to VADM Peterman.
- ³ <http://auxdata.uscg.gov/>, 5 April 2007.
- ⁴ Ibid., 5 April 2007.
- ⁵ "NMC - A Sense of Urgency and a Vision for Change," David C. Stalfort, captain, U. S. Coast Guard, commanding officer, National Maritime Center, June 12, 2007.

Within this AOR, when one sees a Coastguardsman, he will almost always be an auxiliarist.





Commodity Flow on the Western Rivers

by LT JILL BESSETTI

U.S. Coast Guard Eighth District Western Rivers Division

LT ALLISON COX

U.S. Coast Guard Eighth District Western Rivers Division

Of the nearly 25,000 miles of navigable waterways of the United States, a large portion is comprised of the Western Rivers system (Figure 1). The economic importance of this river system can be felt nationwide. For example, in Baton Rouge, La., alone, large ocean-going ships transfer cargo that is carried from ports around the world to barges destined for America's heartland.

This cargo fuels the economy in major inland ports such as Memphis, St. Louis, Chicago, Minneapolis, Cincinnati, and Pittsburgh. It is important to understand the unique design of towing vessels and barges to fully grasp their importance in the economic trade of

this country. Their designs allow them to maneuver in areas inaccessible to deep-draft vessels and enables a large amount of cargo to be transported more efficiently compared to truck and rail transportation.



Figure 1: The major tributaries of the Western Rivers system. Graphic courtesy of the American Waterways Operators.

A "tow" consists of a towboat pushing any number of empty and/or loaded barges. (See the "Rivermen's Lingo" article for an explanation of tugboats vs. towboats.) The tremendous cargo capacity of barges makes them

the most cost-effective, efficient means of transporting bulk goods to and from interior locations of the United States. A tow can be made up with as many as 40 barges or as few as one barge, depending on the cargo destination and the size of the waterway.

A close examination of the economic impact resulting from the loss of this vital system of commerce reveals that even a minor incident on the Western Rivers system could result in devastating direct and indirect economic impact to any number of large metropolitan areas throughout the country. The Western Rivers system is not simply individual rivers with different purposes, but an interconnected system providing a continuous waterway linking even the most remote areas of the United States. For example, a major incident that occurs in Cairo, Ill. is likely to have significant and resounding effects on numerous major ports both up and down the river system.

Major Commodities Flowing on the Western Rivers

Millions of tons of foreign and domestic commodities enter, transit, and depart the country via the Western Rivers system. Many of the high-tonnage ports are found on the Ohio and Mississippi Rivers, making the flow of traffic throughout the system essential to the nation's economy, domestic and international food supplies, and daily maritime operations.

Figure 2 depicts the most common commodities that transit the nation by barge, many of which are produced within America's heartland for domestic and international trade. The top ten commodities include rock and gravel, petroleum products, crude petroleum, coal, chlorine and other chemicals, ammonium nitrate, limestone, grain and farm products, wood and forestry products, and pulp and waste paper.

Transporting Commodities on the Western Rivers

The waterway system is the most efficient and cost-effective mode of transportation in the country. Figure 3

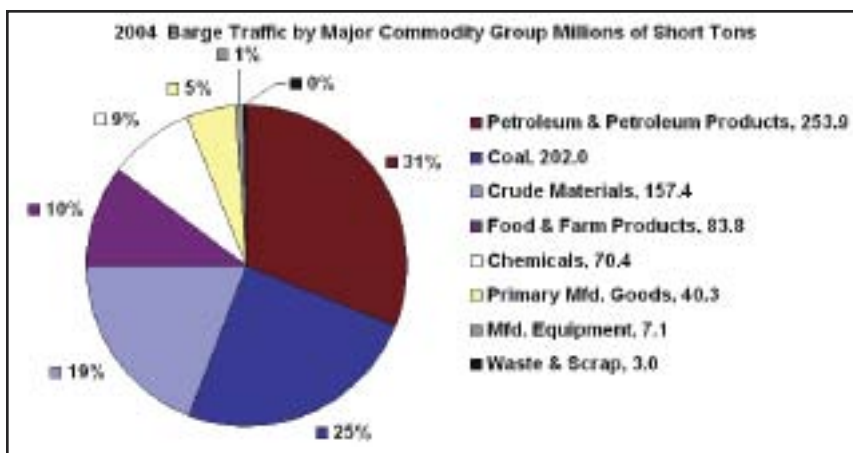


Figure 2: According to the U.S. Army Corps of Engineer's Navigation Data Center, Waterborne Commerce Center, in 2004, barges carried 817,908,000 short tons¹ of commodities. The chart displays the break-down of major commodity groups, with the data rounded to the nearest tenth of a million. U.S. Army Corps of Engineers graphs courtesy of the Navigation Data Center, Waterborne Commerce Statistics Center, New Orleans, La.

shows the comparison of transporting commodities by rail, barge, and truck. A single 1,500-ton barge can carry as much as 453,600 gallons or as much cargo as 15 large railroad cars or 58 large trucks.

The savings can multiply as well, since one towboat pushes multiple barges at a time. A 15-barge tow can carry as much as 6,804,000 gallons and is equal to 225 train cars or 870 semis. In size, a 15-barge tow is roughly .25 miles long. A 225-car train would be 2.75 miles in length, and bumper to bumper, 870 trucks would cover 11.5 miles. The fuel cost for a towboat is much lower and the efficiency much higher than for railroad locomotives or trucks. A truck can carry one ton of cargo for approximately 59 miles per gallon of fuel, while a rail car can travel approximately 202 miles. A barge has the capacity to move one ton of cargo 514 miles per gallon of fuel.

The economic value of transporting freight and materials by means of the nation's inland waterways has been demonstrated and proven by many industries such as mining, agriculture, petroleum, iron and steel, chemicals, and many others. Water transportation requires less energy per ton mile than any other method of freight transportation. This makes low cost one of the inherent advantages of river transportation.

There are also many environmental advantages to barge transportation. Due to the growing threat of environmental pollution, handling bulk commodities by water transportation proves to be an effective method to transport goods in America's intermodal transportation system. Numerous studies show that the

water carriers consume less energy and produce the fewest emissions per ton mile.²

Value to the Nation's Economy

As the main arteries of the Western Rivers system, the Mississippi and Ohio Rivers are responsible for the movement of many cargoes essential to the economic value of our nation.

America's tugboat, towboat, and barge industry transports 20% of America's coal. This is enough coal to produce 10% of all electricity used annually in the United States. The maritime industry also moves 60% of U.S. grain exports and carries most of the home heating oil and gasoline to New England.³

There are currently nearly 4,000 modern tugboats and towboats and more than 28,000 barges moving more than 800 million tons of raw materials and finished goods each year.⁴

The U.S. Army Corps of Engineers (USACE) reports that nearly 2.5 billion tons of cargo are shipped to, from, or through 40 states in the continental U.S. each year. The U.S. marine transportation industry supports nearly \$1 trillion in commerce and 13 million jobs. Inland waterways maintained by USACE handle more than 630 million tons of consumer goods per year val-

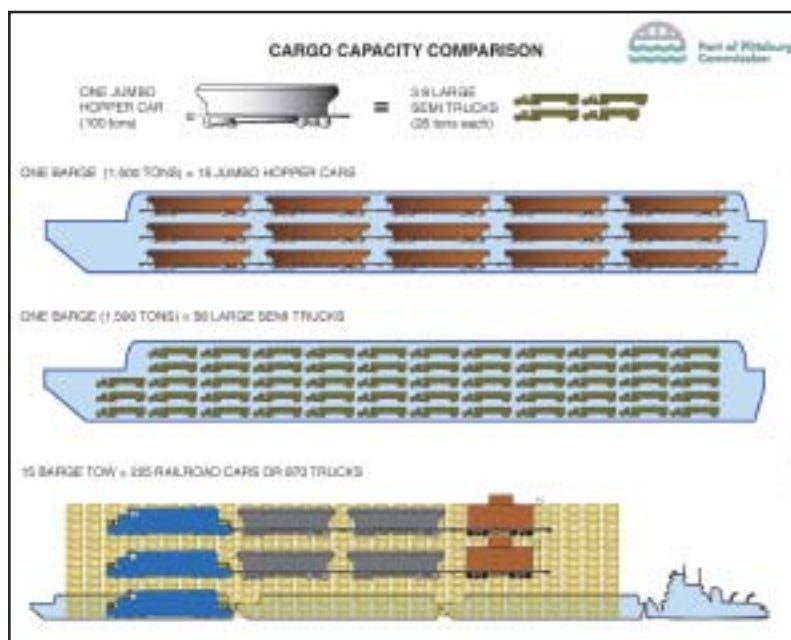


Figure 3: Comparison of barge, truck, and rail carrying capacity. Graphic courtesy of the Port of Pittsburgh Commission.

ued at over \$70 billion. The unit cost to transport commodities over inland waterways is two to three times lower than other forms of transportation, which translates into about \$7 billion in transportation savings annually for American businesses.⁵

The importance of the Western Rivers system does not stop at the movement of products such as coal and grain. The economic advantages provided in support of power plants, local and regional water supplies, and recreational activities have grown tremendously in recent decades. Public waterway recreational activities support the nation's economy in excess of \$40 billion annually.⁶ Specifically, the Western Rivers supports recreational activities such as skiing, boating, fishing, fireworks displays, and a variety of other water sports.

Case Studies on Two Western Rivers Ports

Not only is it important to examine the impacts of past accidents (see Belleville Lock and Dam sidebar) when looking at the economic value of the Western Rivers, but it is equally important to study the contributions of certain ports within these dynamic waterways. The following two ports provide excellent examples of what would be at risk to certain regions if the Western Rivers system was impacted in any way.

Economic Impact of the Port of St. Louis

The 18th-largest metropolitan area in the country, St. Louis, Mo., is both a major city and a thriving commercial port. Located on the upper Mississippi River between river miles 171.9 and 191.2, the port provides a direct link to major interstates, railways, and river systems throughout America's heartland. The population of the metropolitan area is approximately 2.8 million, which includes the city of St. Louis, seven counties in Missouri, and eight counties in Illinois.

The third largest inland port, and the northernmost port remaining open year-round, St. Louis is a critical conduit to the entire Western Rivers system, particularly the Mississippi, Ohio, Illinois, and Missouri rivers. Just north of St. Louis, the Mississippi River opens into the Missouri and Illinois Rivers. The Missouri River allows for waterways shipping throughout the Midwest, and the Illinois River continues into the Chicago River and the Great Lakes. With no locks south of St. Louis, the river flows directly to the Port of New Orleans and the Gulf of Mexico, which allows for international and domestic imports and exports.

More than 30 million tons of essential commodities pass through the Port of St. Louis each year, including grain,

limestone, soybeans, stone, coal, petroleum products, and chemicals. In-transit goods are stored, transferred, and distributed for worldwide transport.⁷ Agricultural and construction products, plastics, and chemical manufacturing are among the major industries in the state of Missouri, and these products further the nation's economy with both international and domestic trade.

Specific industries supported by the Port of St. Louis include the hydro- and electric energy sectors, construction, farming, and public water municipalities, as well as fitness and recreation. As seen in the Belleville Lock and Dam accident, chlorine and limestone are critical commodities for water purification and power generation.

If the Port of St. Louis were to close down, northbound traffic on the upper Mississippi River would not be able to transit the Missouri or Illinois River, and southbound traffic would not be able to transit the lower Mississippi or Ohio River, or other rivers and tributaries. There is no feasible redundancy that can replace the barge shipments of these essential products, so river operations are essential to economic development and sustainment.

Economic Impact of the Port of Pittsburgh

The rivers of southwestern Pennsylvania serve a unique and vital role in the economic health of the region. The Port of Pittsburgh, located at the northeastern end of the inland waterway system, is physically unusual, comprised of three distinct and connected rivers—the Allegheny, Monongahela, and Ohio Rivers—forming an arterial network throughout the 11-county (7,643 sq. mi.) region and actually passing through or alongside eight of those counties.

The 200-mile expanse of commercially navigable waterway has enabled numerous industries to locate along the rivers to take direct advantage of inexpensive transportation. This makes the Port of Pittsburgh unique, in that much of its cargo is either consumed or produced within the port district itself, instead of simply being shunted through to another destination. With more than 200 individual barge facilities in the port district, the port is an integral and organic part of the regional economy, not merely a single-point enterprise.

As a result of this concentrated diversity of industry in proximity to the rivers, the range of employment supported by the Port of Pittsburgh consists not only of those directly involved in waterway transportation and its peripheral services, but also those employed by manufacturers, utilities, services, and merchandisers who rely on waterway transportation directly or indirectly.

Impact of a Significant Disruption to the Western Rivers System



Barges that broke free from the towboat *Jon J. Strong* obstruct the dam at Belleville Lock and Dam, mile marker 203 Ohio River. USCG photos by MST1 Kyle Chapman.



A disruption to the Western Rivers system can have a domino effect on the movement of goods. This incident at the Belleville Lock and Dam accumulated costs of over \$3 million per day, based on U.S. Army Corps of Engineers and industry estimates.

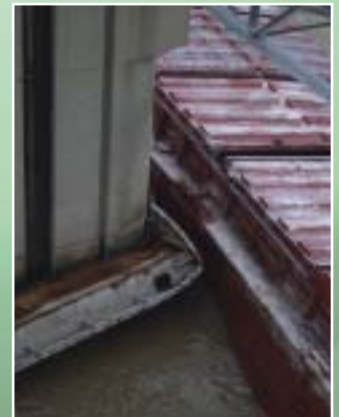
Early on the morning of January 6, 2005, the towboat *Jon J. Strong* lost control of nine of its 12 barges while exiting Belleville Lock and Dam in Reedsville, Ohio. Four of the nine barges sank above the dam and prevented

USACE from using the dam to control river and pool levels. Fortunately, no personnel casualties resulted, but the economic impact to the towing industry, facilities, and marine transportation system was devastating.

With some of the nation's busiest inland ports and significant domestic commerce tonnage, the Ohio River is critical to the maritime transportation system. The seemingly minor 42-mile river closure that resulted from the loss of river pool yielded devastating financial and operational consequences for the U.S. Army Corps of Engineers and the maritime industry. The financial impact due to structural damage to the dam and the loss of river pool and repair costs for USACE was estimated to be \$2 million per day.¹ The river closure also threatened the operation of many chemical facilities and power plants along the Ohio and Mississippi Rivers.

The devastation felt by USACE was minor compared to that of the towing industry, energy sectors, and chemical companies, which cumulatively lost billions of dollars and forced some facilities to shut down operations.² Affected industries estimated that the accident cost them approximately \$1 million per day. Most significantly impacted were the energy industry and water municipalities that rely heavily on limestone and chlorine for plant operations. The Ohio River valley is a large producer of these essential commodities, which are shipped to facilities throughout the Western Rivers system. This river closure directly impacted chemical and water treatment plants as far away as St. Louis, Mo.

Environmental health and safety regulations limit the allowable on-demand stockpile of certain chemicals. As normal operations occur on the river, chemicals such as chlorine and limestone are restocked as needed to maintain operations. With the Ohio River closure, the shipments that were expected to supply the nearly depleted chemical products were halted. In order to mitigate the impending chemical shortages, the U.S. Army Corps of Engineers worked with the towing industry and maritime facilities to determine which tows required priority locking, and how to best coordinate river traffic with the reduced river pool.



Although the Belleville Lock and Dam casualty was a significant financial detriment, the location of the incident certainly was better than if it had occurred downriver, near the confluence of the Ohio and Mississippi Rivers. A shut-down of the river closer to Cairo, Ill. would have had a much larger impact on the water levels of the lower Ohio River and lower Mississippi River, which could have stopped traffic on both rivers, and much more significantly impacted the entire river system.

Endnotes:

¹ Historical data regarding the Belleville Lock and Dam casualty was provided by MSU Huntington.

² <http://www.waterencyclopedia.com/Po-Re/Recreation.html>.

Some 217,000 jobs, approximately 17% of the total regional workforce, are supported by the port's activities, and the region is home to 2.65 million people, all of whom are in some way affected by the rivers, whether as employees, consumers, participants in recreation and tourism, or as taxpayers (since the movement of

freight on the water takes much of the burden away from overland infrastructure).⁸

The Port of Pittsburgh handles a wide range of commodities, and while three-fourths of it is coal, it also includes sand and gravel, iron ore, scrap, non-ferrous



ores, road salt, jet fuel, gasoline, kerosene, fuel oils, asphalt, solvents, fertilizers, cement, concrete, lime, glass, and iron and steel products.

Since most of the inbound commodities are used within the region, a wide range of industries are supported throughout the port district. Inbound and locally mined coal is used for electrical power generation, and locally mined coal is also shipped out to be blended with coal from other sources or used in coke production (a fuel used in steelmaking). Building and construction materials are produced locally using sand and gravel, lime, gypsum, and asphalt.

Barges deliver jet fuel for use at the Pittsburgh International Airport as well as the petrochemicals used in plastic manufacturing. Barges also transport specialty steel products. This provides an array of manufacturing benefits by being able to bring in basic steel materials and ship finished products. Finally, southwestern Pennsylvania's winter weather can be quickly dealt with thanks to a plentiful supply of road salt that can be inexpensively delivered by barge.

While the waterway transportation industry directly supports nearly 15,000 jobs, the shippers and consignees also support 30,000 additional direct manufacturing jobs. Purchases made by these firms in the local economy (totaling over \$9 billion) support almost 150,000 "indirect" jobs. Furthermore, re-spending by direct employees among local businesses supports another 23,000 "induced" jobs. Taxes generated include \$2.2 billion federal and \$1.0 billion state taxes.⁹

Consumer-based commerce is also supported by the waterways, with water-related recreation being an important component of the leisure life of residents in the region. Pleasure boating activities include fishing, motorboating, rowing, kayaking, and canoeing. Commercial boating operations consist of excursions and guided tours, educational programs ("floating classrooms" where students learn through direct interaction with the rivers), and passenger services such as water taxis and shuttles. The rivers also host organized events such as the Three Rivers Regatta and professional bass fishing tournaments. As a direct outgrowth of the popularity of water recreation, marinas and waterfront restaurants are as plentiful as industrial river terminals.

Finally, an often-overlooked economic impact of the rivers is the availability of the water itself. Southwestern Pennsylvania's expansive watershed is a plentiful

resource for community water, industrial water supplies for various manufacturing processes, and fire-fighting water. However, the mere presence of the rivers is not enough to ensure a consistent and reliable water supply to meet these needs. The stable pools created by the navigation dams are necessary to provide adequate depth to keep water intakes submerged. Flood control dams upstream on the main rivers and tributaries help smooth out seasonal changes.

Beginning with naturally flowing water, which is precisely regulated by a series of locks and dams, the Port of Pittsburgh is an economic dynamo that has more than an "impact" on southwestern Pennsylvania; it can be said that it *is* southwestern Pennsylvania.

The range of economic advantages from the Western Rivers system is expansive. Waterways transportation is by far the most efficient means for moving bulk commodities throughout the interior of the United States. The importance of the Western Rivers system is immeasurable. It links steel workers, coal miners, and farmers together to form a mighty network of commerce that fuels America's hearty economic engine.

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Special thanks to:

U.S. Coast Guard headquarters, Office of Standards Evaluation and Development, for historical information regarding the Belleville Lock and Dam casualty.

The Port of Pittsburgh Commission for contributing statistics on the economical impact of the Port of Pittsburgh section and the barge-truck-rail comparison graphic.

The American Waterways Operators for providing the Western Rivers graphic and statistical information on commodity flow.

Endnotes:

- ¹ In shipping, a "short" ton is 2,000 lbs., a "long" ton is 2,240 lbs.
- ² "Value of Tributary Elements of the Inland Waterway System," U.S. Army Corps of Engineers.
- ³ "Grain Transportation Report," U.S. Department of Agriculture.
- ⁴ "Facts about the American Tugboat, Towboat, and Barge Industry," the American Waterways Operators.
- ⁵ "Value of Tributary Elements of the Inland Waterway System," U.S. Army Corps of Engineers.
- ⁶ <http://www.waterencyclopedia.com/Po-Re/Recreation.html>.
- ⁷ "Tonnage for Selected U.S. Ports in 2005," U.S. Army Corps of Engineers, Navigation Data Center, Waterborne Commerce Statistics Center, New Orleans, La.
- ⁸ Port of Pittsburgh Commission.
- ⁹ Ibid.

Navigating Through Locks and Dams



by MR. DAN BUTCHER
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Before the introduction of locks and dams, the Inland River system (also known as the Western Rivers system) was often obstructed throughout its entire length by snags, rocks, gravel, and sandbars. The navigable width or depth of the river channels was also variable and unpredictable from season to season.

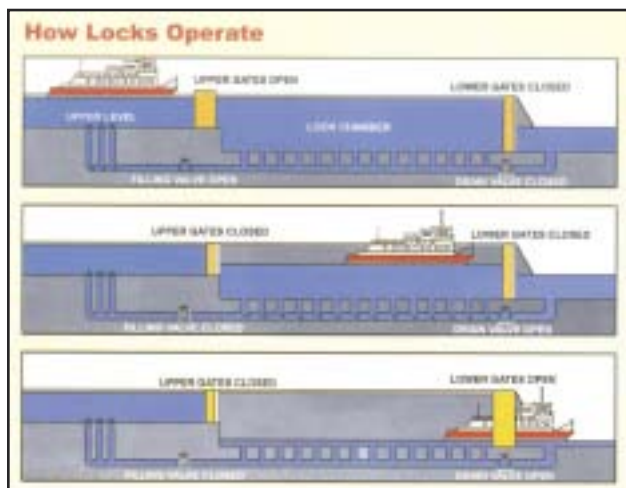


Figure 1: The basic operation of a lock. All graphics and photos courtesy U.S. Army Corps of Engineers.

Locks and Dams

As early as the 1800s, the U.S. Army Corps of Engineers (USACE) was removing obstacles and building wing dams and training dikes to concentrate flow in the main channels in an attempt to improve the navigability of the rivers. Crews also constructed dams to provide adequate depths for navigation during all seasons. Each dam impounds a pool for navigation and the

locks provide the means by which vessels are raised or lowered between pools (Figure 1).

Originally, most inland navigation projects featured a low-lift wicket dam (Figure 2), which could be raised when necessary to maintain a pool for river traffic to pass. During high water, the wickets were lowered, allowing vessels to bypass the locks and pass through in an open river condition. Wicket dams remaining in operation are locks and dams 52 and 53 on the Ohio River near Paducah, Ky., and Peoria and LaGrange Locks and Dams on the Illinois River. Locks and dams 52 and 53 will be eliminated when the construction of Olmsted Locks and Dam is completed (currently scheduled for completion in 2012, depending on funding).



Figure 2: Locks and dam, with the wicket dam raised.



Figure 3: The Inland River navigation system.

The Inland River System

In the eastern part of the United States, the Inland River system (Figure 3) is primarily comprised of three major systems. The lower Mississippi River system above Baton Rouge, La., includes the Arkansas and Red Rivers and transported a total of 181 million tons of cargo in 2005. This stretch of the river is free flowing and not impounded for navigation (has no navigation dams). The U.S. Army Corps of Engineers spends a tremendous amount of effort to maintain a navigable channel via miscellaneous structures, bank stabilization, and dredging.

The upper Mississippi River (above river mile 185.5 near St. Louis, Mo.) and the Ohio River systems are impounded by locks and dams that maintain pools with a minimum depth of nine feet, year-round. The upper

Mississippi River system includes the Illinois and Missouri Rivers and transported a total of 117 million tons of cargo in 2005.

The Ohio River system (Figure 4) includes the Monongahela, Allegheny, Kanawha, Tennessee, Cumberland, Big Sandy, and Green Rivers and transported a total of 280 million tons in 2005.

Other important inland systems include the Columbia/Snake Rivers, the Tennessee/Tombigbee Waterway, the Gulf Intracoastal Waterway, and the McClellan-Kerr Navigation system.

Commerce Necessitates Upgrades

By the 1950s, growing commerce on the Inland River system had made low-lift wicket dams obsolete. Not only had traffic volume grown tremendously, but larger tows were in operation and had to be broken up to pass through the small chambers accompanying the old low-lift dams. Deterioration of the structures had also taken its toll, causing an increase in maintenance costs.

In light of these factors, USACE decided to replace the obsolete system of wicket dams. The typical project in high-tonnage areas would consist of a 1,200-foot by 110-foot main lock chamber and a 600-foot by 110-foot auxiliary chamber. The dam would typically be a non-navigable structure with tainter gates. The simplicity, light weight, and low hoist capacity requirements of tainter gates make them economical and suitable choices for controlled spillways. With tainter gates, spillway flow is regulated by raising or lowering the gate to adjust the discharge underneath.

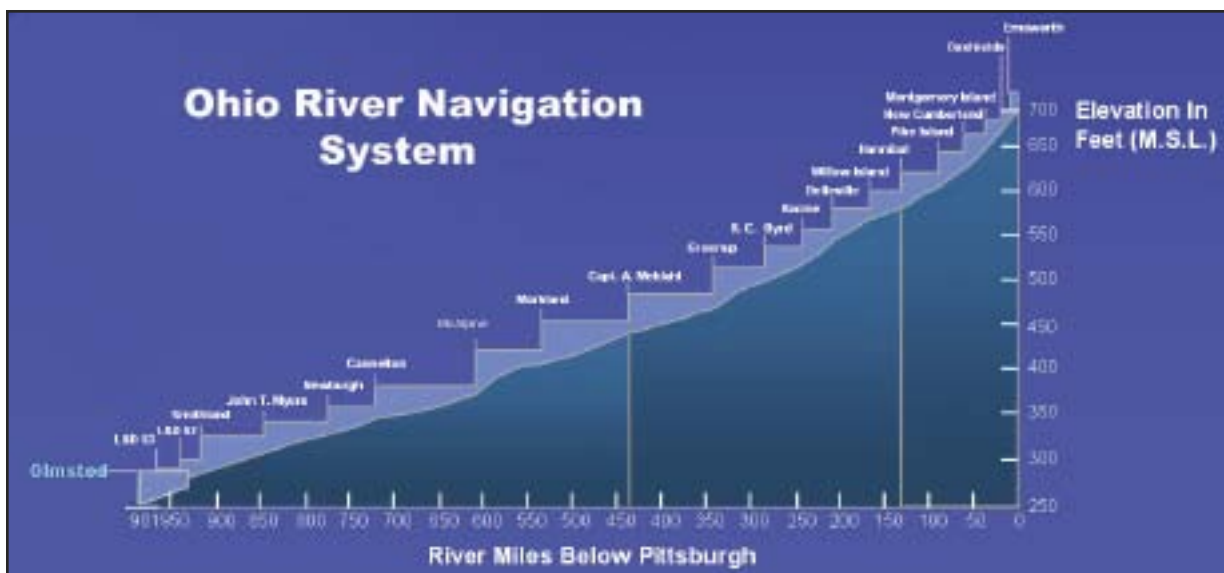


Figure 4: The current profile of the Ohio River, with its high-lift dams.

Smithland, the last of the high-lift dams completed on the Ohio River in 1980, is the only project that currently features two chambers that are 1,200 feet in length. Construction is currently underway at McAlpine Lock and Dam in Louisville, Ky., which will add a second 1,200-

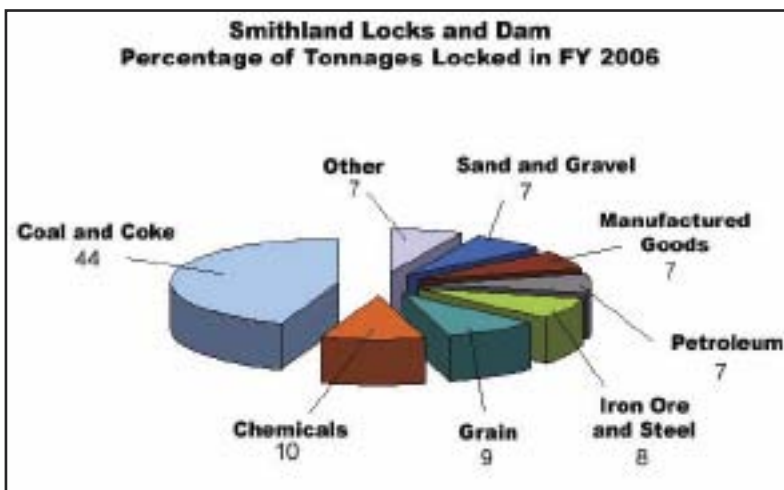


Figure 5: A breakdown of the types of cargo transported through Smithland Locks and Dam.

foot chamber. The new Olmsted Locks and Dam, which will replace Locks and Dams 52 and 53, will also have dual 1,200-foot chambers. Other projects have been authorized to extend the length of the auxiliary 600-foot chambers to 1,200 feet at J.T. Myers and Greenup Locks and Dams on the Ohio River.

As a nation, our reliance on the Inland River system continues to grow. For example, in fiscal year 2006, Smithland Lock and Dam on the Ohio River locked over 81 million tons of cargo (Figure 5). Inland navigation provides a safe and environmentally friendly alternative to truck and train transportation, creating billions of dollars in annual savings. It also reduces highway congestion and pollution. A fully loaded barge is the equivalent of 15 rail cars or 58 trucks. A single tow consisting of 15 barges, therefore, replaces as many as 870 trucks on our highways (Figure 6).

River Closures Have Severe Economic Impact

From 1965 to 2000, the total tonnage of cargo transported on the Ohio River alone rose from 103 million tons to more than 250 million tons. Therefore, with the heavy traffic on the Inland River system, particularly on the Ohio and Mississippi Rivers, maintenance and unscheduled closures are becoming a major concern. Power plants on these rivers store only enough coal to supply a few days' power. In the event of a river shutdown, they must either find alternate and more expensive means of transportation, or redirect power from other supplies.

Factories that rely on raw materials supplied by the navigation industry could be forced to cease operations in the event of a prolonged river closure. As the locks and dams in the system have aged, the number of unscheduled closures has climbed. The average age of the locks on the Mississippi and Ohio Rivers is 58 years.

Accidents have also taken their toll on the river projects. USACE must continue to be prepared to respond to these events. In January of 2005, at Belleville Locks and Dam in W.Va., a tow exiting the main chamber lost nine barges. These barges were carried downstream into the dam and became trapped on the dam wall structure, preventing it from operating for an entire month. (See related "Commodity Flow" article.)

Maintenance and Repair

Maintenance of locks and dams comes in all sizes and complexities, ranging from greasing fittings to dewatering lock chambers for inspection or major repairs. Small jobs are routinely handled by personnel stationed at the locks and dams project sites.

Larger tasks are tackled by private sector contractors and USACE repair fleets, comprised of floating workshops that can accomplish anything from lifting heavy loads to fabricating replacement parts. For large jobs and tasks, which are given emergency priority, it is becoming more common for USACE districts and divisions to share personnel and resources in a regional effort. This allows repairs to be accomplished in a more efficient manner. Specialized equipment, such as the floating heavy-lift crane *Henry M. Shreve*, shown in figure 7, gives USACE options for safer, more efficient work.

As the locks and dams continue to age and wear, major components become less reliable or offer less efficient service. The commercial navigation industry participates in the budgeting of major maintenance items by paying a tax on fuel consumed during inland waterways transportation. Revenues from the tax are deposited in the Inland Waterways Trust Fund (established through the U.S. Treasury Department). This fund is used to pay for half of the costs of new and replacement projects on the inland waterways system. The Water Resources Development Act of 1986 established the Inland Waterways Users Board to give commercial users a strong voice in deciding how these funds should be spent.

Each year it becomes more difficult to maintain the aging infrastructure of the inland waterways. The system has been extremely reliable and the navigation industry and its customers depend on its continued reliability. USACE continues to seek out new tech-

niques and streamline its processes to meet this need and better utilize available funds and resources.

Brig. Gen. Bruce A. Berwick of the Great Lakes and Ohio River Division introduced one such initiative in January 2006 when he signed a new maintenance standard. This program focuses available funding to the areas where it can do the most good for system reliability and efficiency by identifying projects that have high economic risks combined with high potential for unscheduled closures.

As the infrastructure continues to age, USACE will search for new ways to focus its efforts and provide the reliable and efficient service the navigation industry has come to expect. With the wide diversity of goods transported and the economic value the inland waterways represent to the nation, the challenges cannot be ignored.

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Bibliography:
 Clarence W. Newman, "Ohio River Navigation, Past - Present - Future," 1979.
 Leland R. Johnson, "The Ohio River Division, U.S. Army Corps of Engineers," 1992.
 U.S. Army Corps of Engineers Great Lakes and Ohio River Division, "Great Lakes and Ohio River Navigation Systems Commerce Report, 2004."
 U.S. Army Corps of Engineers, "Serving the Armed Forces and the Nation," 2006.
 U.S. Army Corps of Engineers Databases: Lock Performance Monitoring System Operations and Maintenance of Navigation.

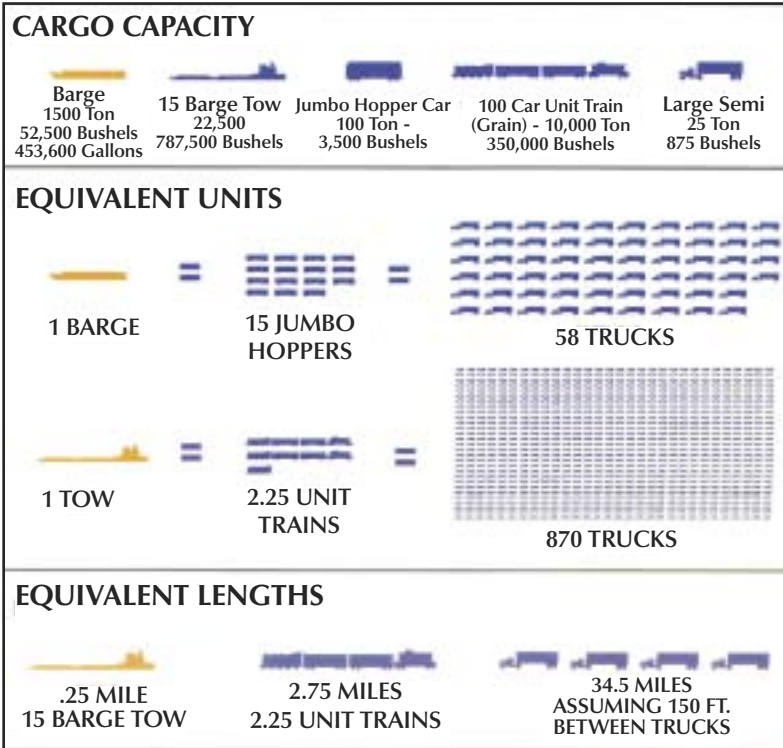


Figure 6: Barge capacity as compared to capacities of other forms of transportation.



Figure 7: The floating heavy-lift crane Henry M. Shreve.

Brown Water Operations

Ensuring that the Western Rivers remain open.

by LCDR WAYNE R. ARGUIN JR.
Chief, Prevention Department
U.S. Coast Guard Sector Lower Mississippi River

LCDR PHILLIP ISON
Chief, Prevention Department
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The call to Sector Lower Mississippi River's command center indicates that a 36-barge tow has intentionally grounded along the river bank north of Memphis, Tenn. If this had been a similar call to a coastal command center, it may have spooled up investigators and inspectors, alerted aids to navigation (AtoN) teams of potential AtoN discrepancies, and elicited a flurry of internal calls to notify the command.

But the intentional grounding of a tow is commonplace throughout the Western Rivers. Towing vessel operations regularly "push in" to the bank to allow larger tows to pass in tight bends or to rearrange barges within a tow at a barge fleeting area. Since typical towing vessels are not equipped with anchors, they use the thrust of their power plants to hold position.

This is No Sea Cruise

However, the unintentional grounding, collision, or allision of even a single tow can have a significant economic impact to the entire Western Rivers system. Since the Western Rivers system is essentially a network of channels, any obstruction to the flow of traffic can have an impact on operations throughout the entire system.

The Western Rivers present unique navigational challenges. Where coastal channels are charted and regularly maintained through periodic dredging, river

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Incident Management Division, U.S. Coast Guard Sector
Upper Mississippi River

channels are always shifting, largely influenced by the rate of change in the river's elevation, sedimentation, and man-made structures. Shoals and strong currents can appear just hours after a tender or survey vessel has verified the sailing line.



The Racine Lock and Dam located near Letart, W. Va., on the Ohio River. In March 2007, during a period of high water, a towboat lost control and released its tow of fifteen coal barges, which allided with the dam wall. USCG photo by MST2 Andrew Caldwell.

The system of locks, dams, and bridges adds to the operational challenges faced by today's towboat operator. Additionally, the result of even a minor incident in this system can have major consequences. For instance, if a multi-barge tow hits a bridge, this can lead to the complete failure of the tow's integrity, turning a composite unit into 30 to 40 individual hazards to navigation.





The Racine Lock and Dam allision. Luckily, the barges and dam only suffered minor damage and none of the barges sank or went over the dam. The river was only closed for one day. USCG photo by MST2 Andrew Caldwell.

Groundings within the navigable channel are particularly disruptive because they often result in extended river closures, especially when lower river conditions require narrower-than-normal channel widths. There's simply no other waterborne route to access the Gulf of Mexico, the Great Lakes, or ports throughout the Midwest.

A Case in Point

These casualties occur more often during high water conditions. Strong currents require downriver-bound tows to maneuver with precise coordination between rudder commands and engine orders to safely pass between bridge spans.

In one case in January 2007, a 42-barge tow (6 feet long by 7 feet wide) allided with the Natchez I-20 Bridge, sending all 42 barges careening down river. Other towing vessels pushed their tows into the bank and assisted with the capture of barges that had drifted nearly 20 miles from the initial impact site. Three of the barges sank within 300 yards of the bridge, very close to the marked navigable channel.

U.S. Army Corps of Engineers (USACE) survey vessels confirmed the location of each submerged barge so that commercial traffic could resume with minimal delay, but salvage and removal of the damaged barges could not be completed due to the extreme currents. While not the optimal solution, officials decided to resume navigation near the Natchez Bridge with known submerged objects precariously close to the commercial channel after assessing the potential for future incidents and considering alternative solutions to redirect the flow of traffic. A broadcast notice to mariners remained in effect for many months to alert waterways users of the potential hazards until the barges could be safely removed from the river bottom.

Incident Recovery

After any grounding or similar incident, recovery and restoration is time sensitive and often requires multi-agency coordination to ensure the safe and efficient movement of commerce on the nation's largest marine transportation system.

Officers in charge of Coast Guard river tenders rely heavily on the U.S. Army Corps of Engineers and National Weather Service river stage forecasts to determine the most effective way to mark the river so that tows can proceed without incident. The efficiency of the Western Rivers marine transportation system is driven by these forecasts and the effectiveness of Coast Guard river tenders to accurately mark the navigable portion of the river.

A rapid change in river levels (greater than two feet per day) can wreak havoc on a channel's integrity, leading to more frequent AtoN verification patrols and channel surveys by USACE resources to identify trouble spots that may lead to casualties.

When a casualty that has the potential to impact the flow of commercial traffic does occur, partnerships forged in the development of the waterways action plan are vital. The action plan is designed to identify hazardous locations and conditions that may limit commercial navigation. The predetermined risk mitigation strategies contained within each waterways action plan annex were developed by agency and industry stakeholders to address potential navigation challenges and limit unexpected river closures.

The groups use teleconferences to assess the need to redirect Coast Guard AtoN resources and USACE survey/dredge vessels while ongoing salvage operations work to remove cargo or re-float damaged barges to restore commerce. Coast Guard investigators deploy to oversee salvage operations and to determine whether conditions leading to the initial casualty could present challenges for other commercial operators.

Where traffic control is required, Coast Guard Captain of the Port authority allows the sector commander to establish temporary safety zones to control vessel movements until conditions improve and safe navigation can be restored. In any case, communication procedures established within the waterways action plan for each river ensure that all concerned parties are informed and can implement mitigation measures to minimize delays. This frank, open discussion of alternative methods to restore commercial navigation

serves to support Coast Guard decision makers who must determine the best course of action for all concerned.

Salvage and Lightering, Western-Style

Salvage activities on the Western Rivers are similar to other locations but are sometimes complicated by the lack of available resources and the unique challenges posed by high currents and ever-changing river levels. In most cases, a typical dry cargo hopper barge must be lightered using clam shell cranes, one scoop at a time.

Liquid cargo barges may require “over the top” or manifold-to-manifold transfers, if a suitable empty tank barge is available. Temporary repairs, including using wooden shingles to plug fractures in the hull plating, is the most common repair used to restore watertight integrity to a damaged barge so that it can be delivered to a repair facility.

Coast Guard-certificated tank barges must be issued “permits to proceed” prior to continuing voyages so that damage can be permanently repaired at an approved facility. With so few repair facilities on the Western Rivers, damaged barges are often authorized to transit hundreds of miles under strict constraints identified in the permit to effect permanent repairs. Coordination between officers in charge, marine inspection is managed through locally generated “Western Rivers notifications” to obtain permission from each sector to minimize administrative delays.

Even when salvage resources are readily available, water conditions may delay recovery activities. When high water conditions exist, strong currents prevent dive teams from patching holes in submerged barges. If the holes are too large, salvage pumps cannot remove enough water to allow the vessel to float free. In these cases, each day the submerged barge remains on the bottom decreases the likelihood of a successful recovery, due to sedimentation.

When low water conditions exist, barges may not be able to be floated free and may need to be completely emptied of cargo. If cargo removal is not an option, owners may simply wait for Mother Nature to provide a boost in the form of rain. In other instances, teams of towing vessels may attempt to pull the stranded barge into deeper water rather than attempting to lighten cargo from the barge. In all cases, broadcast notices to mariners are issued to advise waterways users of the hazards, so that appropriate passing arrangements can be coordinated.

Weather is also a complicating factor during restoration activities on the Western Rivers. Many of the northern ports experience severe icing conditions that significantly impact the efficient flow of commercial goods. Industry partners, like the River Industry Action Committee and Illinois River Carrier’s Association, work closely with Coast Guard and USACE offices to ensure safe navigation.

During the winter of 2006-2007 alone, portions of the upper Mississippi River and Illinois River experienced a substantial amount of ice that ranged anywhere from eight to 20 inches thick that caused millions of dollars in lost revenue due to slower transit times, unscheduled river closures, and less-than-optimal tow configurations. Some sections of the river were completely gorged with ice, forcing one-way traffic restrictions on commercial operations, which significantly impacted multiple industry interests. When ice coverage was reported to be 100% on Illinois’ Peoria Lake, waterborne commerce was suspended for several days, significantly impacting numerous facilities expecting to receive raw goods for manufacturing.

Safe and successful navigation on the Western Rivers requires close coordination among the Coast Guard, the Army Corps of Engineers, and industry stakeholders to address constantly changing conditions that influence commercial towing operations. Each event requires stakeholders to assess current and forecasted conditions to determine the most effective strategies to restore safe navigation.

Active communications among these partners has dramatically improved with the implementation of the Western Rivers Waterways Action Plan, which continues to improve information necessary to make key decisions with significant economic impact throughout the area. These proactive strategies to mitigate the effects of dynamic river conditions, which are updated with each new event, continue to improve the flow of commerce from the nation’s heartland to ports all over the world.

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Crossing Over

*The bridge program
in the Western Rivers.*

by MR. ROGER K. WIEBUSCH

Bridge Administrator, Eighth Coast Guard District, Western Rivers

Historically, the Western Rivers have provided significant challenges to those willing to test their fate on canoes, rafts, keelboats, and steamboats. Mark Twain humorously and eloquently described the lure, danger, and personal pride of being a Mississippi River pilot in his book "Life on the Mississippi."

In the 1800s, river transportation was the primary method of exploration and national expansion, as it was the best mode suited to move people and goods. It was vital to a growing and expanding nation, but as beneficial as rivers were, they were also major barriers to land transportation.



Eleventh Street Bridge, mile 1.0, Allegheny River. USCG photo by W.F. Knutson.



Pekin Railroad Drawbridge, mile 151.2, Illinois Waterway. USCG photo by R.W. Wiebusch.

Over the River vs. on the River

It has been said that necessity is the mother of invention, and it was necessary to find ways to cross the major rivers that segmented the country, especially the Mississippi River. The 1800s witnessed significant advances and achievements in bridge engineering and technology.

On April 21, 1856, the Mississippi River railroad bridge was completed at Rock Island, Ill. However, 15 days later it was struck (some claim intentionally) by the steamboat *Effie Afton* and caught fire.¹ Thus the competition for space between riverboats and bridges began. This controversy moved downriver to St. Louis, Mo., where James Eads overcame opposition from river interests, the U.S. Army Corps of Engineers (USACE), and engineering challenges to construct the Eads Bridge in 1874, providing a rail crossing for the mighty Mississippi. The river had been conquered, but as more bridges were built across navigable waterways, the conflict between the needs of land and waterborne traffic arose.

The federal government realized the paramount importance of maintaining river navigation while a viable land transportation system developed. To ensure that bridges provided for the adequate needs of navigation, every bridge had to be authorized by an act of Congress, reflecting its vital role in national defense, trans-

portation, and commerce. This oversight was later delegated to the Department of War/Army (specifically, USACE) in Section 9 of the 1899 Rivers and Harbors Act, and transferred to the Coast Guard in 1967 via the Department of Transportation Act.

This simple legislative action propelled the Coast Guard into the regulatory environment of the Bridge Administration Program. Agency concerns about bridges were greatly expanded from prescribing lights to issuing permits for the construction of new bridges or the alteration of existing bridges, approving bridge construction and demolition plans, establishing and enforcing drawbridge operation regulations, and studying existing bridges to determine whether they were unreasonable obstructions to navigation.

The Bridge Administration Program is a powerful tool for making navigational improvements by establishing the required horizontal and vertical clearances provided by bridges. Inadequate navigational clearances create long-term restrictions to commercial navigation and hinder economic development along the waterway. Proactive program management, based on an understanding of navigational requirements and active coordination among the commercial navigation industry, bridge owners, and USACE has produced significant improvements in the navigational characteristics of bridges that span the Western Rivers.



LaSalle Highway Bridge, mile 224.7, Illinois Waterway. USCG photo by W.F. Knutson.

Bridges Can Impede Waterway Navigation

A bridge exerts a significant influence on the navigational characteristics of an entire waterway for the life of the bridge, which is typically 50 to 75 years. A bridge that is built too narrow or too low provides an impediment to safe navigation. Poorly located bridge supports can accentuate the natural challenges presented by rivers, resulting in a very difficult area to transit. Permanent waterway improvements can be achieved by properly locating bridge piers to satisfy the reasonable needs of present and prospective navigation.

While well-designed bridges with properly located bridge supports facilitate vessel movement and eliminate a lot of stress for the vessel's pilot or captain, bridges with poorly placed bridge piers present constant safety risks. Since 1922, the number of bridges that span the 10 major rivers in the Western Rivers area has increased more than 150%. Individually, significant increases have occurred on the upper Mississippi River (83%), lower Mississippi River (400%), and Ohio River (175%).^{2,3}

Bridge clearances provided by many of the older bridges were initially considered adequate based on technology, river conditions, and vessel sizes of the time. However, modernization of the river transportation system and resultant changes in vessel size and type has changed the perception of what is considered



Rockport Highway Bridge, mile 745.6, Ohio River. USCG photo.

adequate for navigation. However, the only way to permanently correct the problem is to replace the old bridges with ones having improved clearances. For example, the two most recent Mississippi River bridge replacements provide 60% more horizontal clearance.⁴

Bridge Construction/Alteration

The Coast Guard must issue a bridge permit to authorize the construction or alteration of a bridge across a navigable waterway. In the Western Rivers area, the process starts with the permit applicant—usually a state highway department or a railroad—informing the Coast Guard of the location for the proposed river crossing. The pier locations and required vertical clearance are established and an environmental document is prepared as required by federal environmental control

laws. If the project is determined to be in the public interest and complies with environmental laws, a bridge permit is issued. The construction phase may take five to eight years and require installation of a variety of relatively fragile temporary structures that partially obstruct the navigation channel, the use of barges with materials and cranes, construction of cofferdams with workers inside while barges transit, and temporary channel blockages.

The construction phase is the most challenging and requires ongoing effective coordination among the Coast Guard sector, waterway users, USACE, and the contractor who is building the bridge. Specific work schedules are established and updated; the sector may need to close the river or, in critical cases, must establish a "regulated navigation area." The key to a successful construction phase is communication and coordination. Significant bridge projects that have demonstrated effective coordi-

unreasonable obstructions to navigation. If the bridge is determined to be unreasonably obstructive, an "order to alter" is issued to the bridge owner that specifies how the bridge must be physically altered to improve navigation past the bridge. The decision regarding whether a bridge is unreasonably obstructive is an economic decision, based on a comparison of the navigation benefits to be derived if the bridge were altered to the cost of making the alterations. In other words, a Truman-Hobbs study requires translating navigation problems into dollars and cents.

A major component of Truman-Hobbs studies (and an indicator of a potentially obstructive bridge) is the number of allisions that occur with the bridge. Whenever a bridge is struck, the mariner is required to immediately report the incident to the Coast Guard, who then notifies the bridge owner, who then assesses the structure for damage. Following an appropriate Coast



Waverly Bridge demolition, mile 293.4, Missouri River. USCG photo by D.A. Orzechowski.

nation among the Coast Guard, bridge owner, and navigation interests are the new bridges across the Mississippi River at Cape Girardeau, Mo., and Greenville, Miss.; and the new bridges across the Ohio River at Portsmouth, Ohio, and Blannerhassett Island, W.Va.⁵

Truman-Hobbs

The Truman-Hobbs Act requires the Coast Guard to study existing bridges to determine whether they are

Guard investigation, the allision information is entered into the Coast Guard's Marine Information Safety and Law Enforcement (MISLE) system database, which can be accessed for allision history and damage costs to include into the Truman-Hobbs study.

Continuing Navigational Improvement

Navigational problems associated with bridges are an economic and operational concern for both the mariner

continued on page 57



Navigational Improvements

The Coast Guard Bridge Program's ability to systematically prevent, correct, and mitigate navigational problems associated with bridges is best illustrated by reviewing the bridge improvements that have taken place on the Illinois Waterway (ILWW) since 1967, when the Coast Guard assumed bridge program responsibility.

Illinois Waterway — Bridges and Clearance data				
	1967	2006	Difference	%Change
Fixed bridges	20	27	7	35%
Drawbridges	25	18	-7	-28%
Fixed bridges (ave hor clr)	380	406	26	7%
Drawbridges (ave hor clr)	170	199	29	17%

Table 1

Navigational improvements and transportation efficiency have been achieved by the effective application of bridge program resources, authorities, and waterway management vision. Table 1 is a comparison of bridge data between 1967 and 2006. In both 1967 and 2006, 45 bridges crossed the ILWW. In 1967 the average horizontal clearance was 263 feet,¹ but by 2006 it had increased to 323 feet,² an increase of 22%.

Between 1967 and 2006, the number of moveable bridges decreased 28%, while the average horizontal clearance increased 17%. A critical problem that had

to be overcome for waterway improvement was to increase the horizontal clearance provided by bridges to match the width of the authorized navigation channel. Concerted efforts were made to ensure that whenever an existing bridge was replaced, new clearances were established to satisfy the needs of prospective navigation. This vision increased the number of bridges providing the same or greater horizontal clearance than the authorized channel by 64%.

The range of bridge clearances is also an indicator of program success and navigational improvements (Table 2). Between 1967 and 2006,

Illinois Waterway Bridges				
Hor Clr	1967	2006	Difference	% difference
0-150 ft	10	3	-7	-70%
150-200 ft	7	9	2	29%
201-250 ft	7	1	-6	-86%
251-300 ft	4	5	1	25%
301-400 ft	11	16	5	45%
401-600 ft	6	11	5	83%

Table 2

significant changes occurred by eliminating bridges that provided narrow horizontal clearances. Bridges that provided less than 150 feet of clearance decreased 70% while those in the 201–250 foot range decreased by 86%. Bridges that provided 251–300 feet of clearance increased by 25% while those in the 301–400 and the greater than 401 foot ranges both increased by 50%. Active interaction with the bridge owners early in the

Illinois Waterway Bridges				
Truman-Hobbs (TH) alterations - horizontal clearance				
Bridge	Pre-TH (in feet)	Post-TH (in feet)	Difference	% Change
Beardstown RR	111	300	189	170%
Pearl RR	124	315	191	154%
P + PU RR	140	307	167	119%
Average	125	307	182	148%

Table 3

bridge planning process—which included providing the required bridge support locations based on navigation input and analysis—resulted in a significant increase in the number of bridges that provided the widest horizontal clearances.

Successful application of the Truman-Hobbs Act allowed alteration of three bridges, increasing the average horizontal clearance by almost 150%, as shown in Table 3. An important corollary to increasing horizontal clearance is the significant reduction in the number of allisions.

Bridges that have been altered or declared as unreasonably obstructive constitute over 60% of ILWW allisions since 1972.³ Two other drawbridges have been declared to be unreasonable obstructions to navigation, but their alteration is on hold pending authorization of funds.

Endnotes:

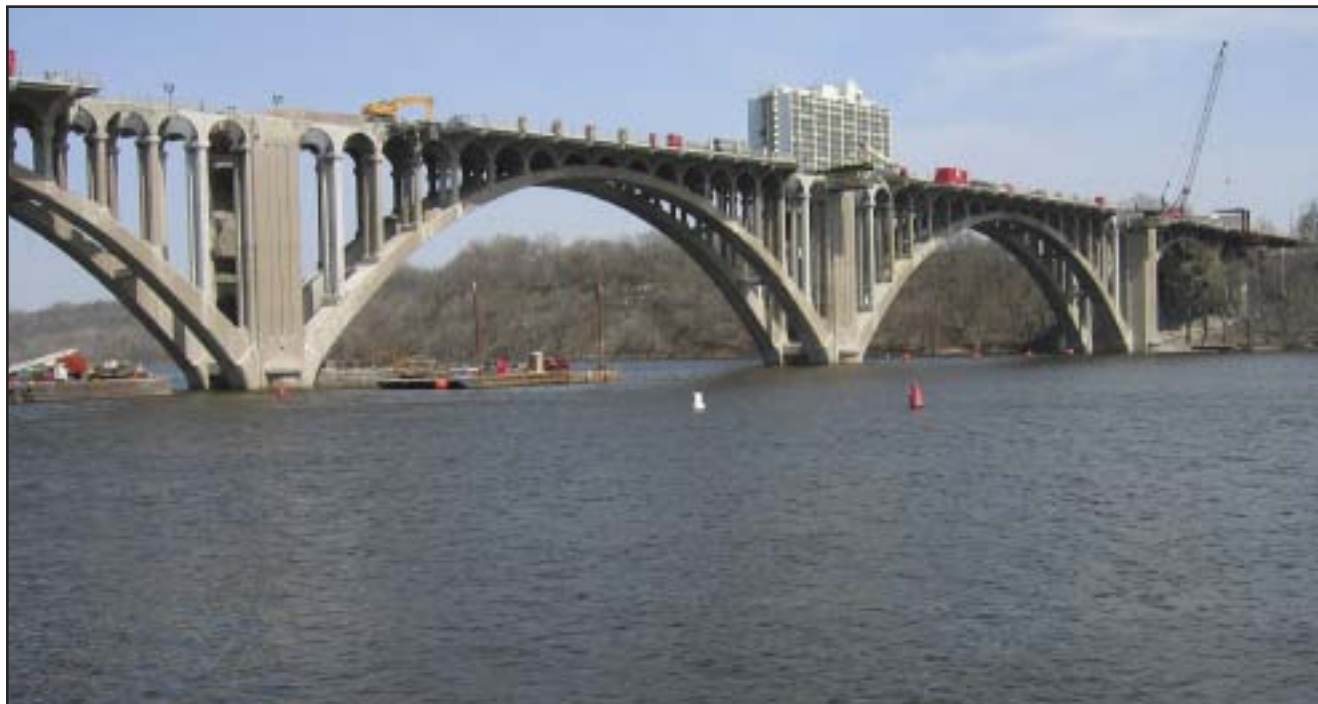
¹ Treasury Department, "U.S. Coast Guard Light List Volume V Mississippi River System of the United States, 1966."

² Department of Homeland Security, "Light List, Volume V Mississippi River System, 2006."

³ CCGD8(dwb) files.

and bridge owner. Meetings have brought together owners, the Coast Guard, USACE, and the navigation industry for frank, open, and professional discussions of navigation problems associated with bridges. These discussions include outdated or improper location of protection structures, drawbridge operations, and communications such as ineffective or confusing bridge navigational lighting and marking.

As a result of such discussions, bridge owners have voluntarily implemented many changes to reduce allisions and reduce the risk of bridge outages for land traffic. One significant navigational improvement has been the voluntary removal of unused bridges, thereby widening the navigation channel and removing obstacles that could be struck by vessels. Another improvement has been replacement of movable bridges with fixed bridges; this is always considered a long-term navigational improvement because it eliminates the possibility of the bridge blocking the navigation channel during repairs or breakdowns.



Ford Highway Bridge, mile 847.8, upper Mississippi River. USCG photo by R.K. Wiebusch.

Responsive drawbridge operations are also a critical bridge management concern. Establishing, monitoring, and enforcing drawbridge regulations ensure this type of bridge is responsive to the needs of navigation. Drawbridge operating regulations are revised when warranted, and any violations are actively pursued under civil penalty procedures.

The effectiveness of the waterway system depends on teamwork and coordination among federal agencies and the navigation community—locks must operate, buoys must be properly placed, and drawbridges need to operate as required. Any malfunction in this coordinated system of vessel movements causes delays at other com-

ponents. Whenever possible, any deviation to the normal drawbridge operation schedule is coordinated with lock closures to minimize waterway impacts.

The Bridge Administration Program has significantly contributed to improvements in the navigational characteristics of the Western Rivers system while balancing the needs of land traffic. Significant changes have occurred in the past 40 years and more will result. The competition for space between bridges and vessels that was first encountered in 1856 will continue, but just as James Eads persevered in his quest of the Mississippi River, the Bridge Administration Program will continue to resolve bridge problems for the safety of waterway transportation.

About the author:

Mr. Roger Wiebusch has served as the Western Rivers bridge administrator for more than 24 years. He has worked with the navigation industry, bridge owners, and other federal agencies throughout a 22-state area to solve and prevent bridge problems, including leading a Quality Action Team composed of industry professionals that revised bridge markings on the Western Rivers.

Endnotes:

1. Costello, Mary C., "Climbing the Mississippi River Bridge by Bridge," Vol. 1, 1995.
2. Department of Commerce, "Light List Mississippi and Tributaries; Thirteenth Lighthouse District 1922."
3. Department of Homeland Security, "Light List, Volume V Mississippi River System," 2006.
4. CCGD8(dwb) files.
5. CCGD8(dwb) files.





Forming Partnerships to Protect Critical Infrastructure

Protecting critical infrastructure and key resources along the Western Rivers.

by CWO DAVID MORGAN

Port Security Specialist, U.S. Coast Guard Marine Safety Unit Pittsburgh

MR. BOB WINTERS

Protective Security Advisor, U.S. Department of Homeland Security

MR. TODD EPPERSON

Port Security Specialist, U.S. Coast Guard Sector Upper Mississippi River

The delivery of goods and services is an important economic activity in the United States. Manufacturing, in particular, is paramount to our nation's economic stabil-

that region's critical infrastructure and key resources (CI/KR)—such as chemical facilities, major bridges, and oil refineries—is crucial to maintaining the nation's econ-

omy, safety, and security. An attack to a CI/KR could potentially impact the entire nation, completely disrupting business and government. Far worse is the possibility that key resources may be used for weapons of mass destruction.

Deciding how to most effectively protect critical infrastructure and key resources has been a difficult question. The Department of Homeland Security created the National Infrastructure Protection Plan to provide a



American Electric Power's John E. Amos Plant, one of the largest power plants in the U.S., located near Winfield, W.Va., on the Kanawha River. AEP photo courtesy of the plant's manager, Mr. Gregory Massey.

ity. Many large cities that serve as major centers of communication, finance, and steel production are located along the Ohio River or one of its tributaries. Protecting

framework to produce and maintain a coordinated national effort. Achieving a strong infrastructure protection plan involves building security partnerships

among federal, state, and local governments, along with private industry.

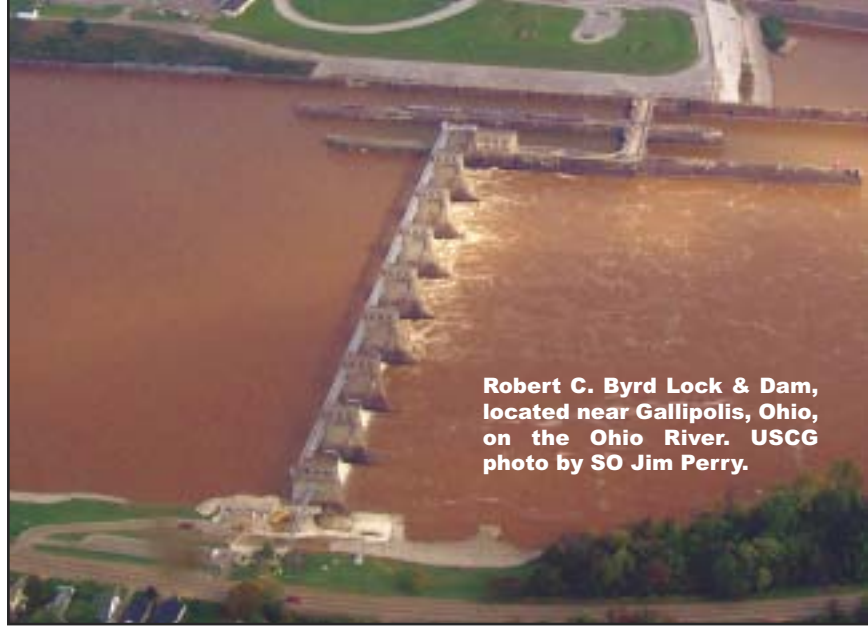
These same entities also need to share in the responsibility of implementing CI/KR protection programs. The Coast Guard's approach to ensuring an effective, efficient program is to build a strong awareness within the Western Rivers waterways system, incorporating other security and protection plans within a specific region.

Establishing Contacts

An important first step in unifying ongoing systems is recognizing key players and providing them with opportunities to interact. The focal point of the local effort in Pennsylvania is the emergency management coordinator of each county, who serves as the hub of the county's police, fire, and emergency medical service through the 911 center. Additionally, the coordinators convene local emergency planning committees for their counties which, according to federal law, oversee the emergency plans of facilities using or storing hazardous materials. Regular meetings unite first responders and the participating facilities, strengthening local ties through communication, education, training, and exercises. In Pennsylvania, each borough or township also has a single point of contact to manage any hazardous incident. However, these contacts typically have other responsibilities and put on an "emergency management cap" only when necessary.

Above the county level, Pennsylvania is divided into nine regions. The counties' emergency management coordinators collaborate to create a regional response capability and make decisions regarding how federal Homeland Security grant program money is spent in the state. These regional task forces have subcommittees that focus on various issues such as equipment purchases, training, exercises, and planning. These subcommittees meet monthly and reflect the energy and focus of the areas they represent. Knowing the key players at this level of government is vital to the Coast Guard's effort in ensuring that its areas of responsibility are taken into consideration.

Another way to connect to companies and the community at the local level is through community advisory panels. Often conducted by larger chemical companies or smaller companies whose product release could potentially harm the community, these panels provide a conduit for companies to communicate with their surrounding communities. By regularly meeting with the people around them, these companies have the chance to report on operations that may



Robert C. Byrd Lock & Dam, located near Gallipolis, Ohio, on the Ohio River. USCG photo by SO Jim Perry.

be of interest, such as the production and proper storage of hazardous materials. Additionally, they work to get the community involved in various safety initiatives like reporting suspicious activity relative to homeland security efforts. Since many advisory panels are along the waterways, the Coast Guard has the chance to initiate and sustain relationships in the local community to demonstrate its role in keeping areas safer through mutual participation.

Providing Forums for Communication

One of the most significant components the Coast Guard developed is the Western Rivers Area Maritime Security (WRAMS) committee and its subset of area maritime security committees. Created as a result of the Coast Guard's 2002 Maritime Transportation Security Act, the WRAMS committee serves as a platform where maritime stakeholders and the Coast Guard can develop a cohesive security plan to protect critical assets. The Western Rivers is a complex system of navigable waterways, extending thousands of miles through numerous states, cities, and jurisdictions. In managing this colossal melting pot, the WRAMS committee's primary role is to provide protection to the vast array of CI/KR spread throughout the central U.S.

Area maritime security committees serve as subcommittees and provide forums for port stakeholders to work together in facilitating the Coast Guard's safety and security missions. Establishing solid partnerships and developing highly effective area maritime security committees to meet these goals is extremely difficult, based upon the economic, geographical, and industrial nature of the Western Rivers region.

For example, the upper Mississippi River funnels vast amounts of agricultural and industrial commodities through the St. Louis, Mo., port area. In 2004, more than 33 million tons of commodities, valued at over 4.4 bil-



lion dollars, were shipped through the port,¹ which does not factor in the dollar amount commodities crossing the area's numerous highway and railroad bridges. The loss or significant delay of this transportation model could possibly cause losses of billions of dollars and significantly impact the regional and/or national economy. Fortunately, many entities in the Western Rivers area are actively engaged and play crucial roles in helping to protect this vital transportation system.

Future Efforts

The continual challenge for all stakeholders is finding feasible and practical solutions with limited resources to mitigate threats not even thought of ten years ago in this portion of the nation. The Western Rivers Area Maritime Security committee's primary role in identifying vulnerabilities and developing strategies to defeat potential threats is absolutely critical in helping industry, state, and federal partners deal with these dynamic challenges. Fortunately, the Coast Guard is fostering a culture of cooperation with the area maritime security committees to create synergy and provide a holistic approach to address the needs of the Western Rivers ports.

Utilizing best practices and lessons learned to develop response plans and managing resources to protect the region will be paramount for years to come. Since the

bulk of security funding is channeled to the nation's critical and highly vulnerable coastal ports, it is more important than ever to facilitate regional area maritime security committees within the river domain to create a culture of trust among maritime partners to meet and neutralize threats.

About the authors:

CWO David J. Morgan is the port security specialist for Coast Guard MSU Pittsburgh, Pa., and has been with the Coast Guard for 24 years active duty and reserve at the rank of senior chief. He holds the qualifications of MTSA facility inspector, facility inspector, and unit command chief. He is a graduate of Marshall University and holds a master of arts degree.

Mr. Todd Epperson is currently the port security specialist for Sector Upper Mississippi River in St. Louis, Mo., and has been with the Coast Guard for one year. Mr. Epperson retired after 25 years of service from the Air Force as a security specialist. He graduated from Webster University in 2005 with a master of arts degree in business and organizational security management.

Mr. Bob Winters is the Department of Homeland Security protective security advisor assigned to the Pittsburgh, Pa., district responsible for coordinating and facilitating the protection of Western Pennsylvania's critical infrastructure. Originally from Pittsburgh, he has a 23-year security career in the Air Force. He has a bachelor's degree in history, a master's in public administration, and is a graduate of the FBI National Academy. He has been the Pittsburgh District's protective security advisor since the inception of the position in May 2005.

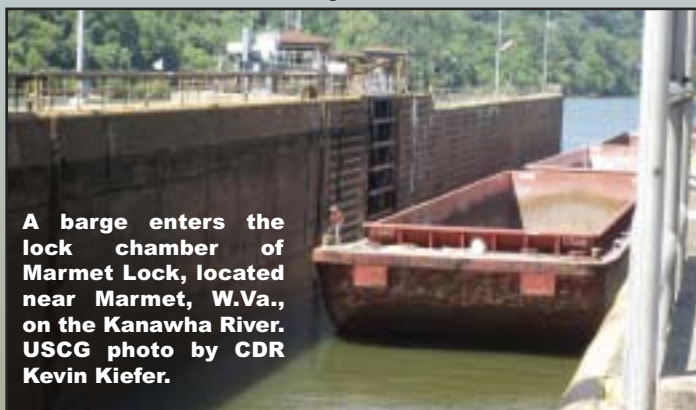
Endnote:

¹ The U.S. Waterway System - Transportation Facts (Dec 2005), Navigation Data Center, U.S. Army Corps of Engineers.

How Infrastructure Can Affect Economy—Double Cut/Double Tripping

More than half of the locks operated by the U.S. Army Corps of Engineers (USACE) are over 50 years old. Many of today's tows operate with more barges than can pass through a lock at one time, so the tows must be "cut" into sections. At the Marmet Lock, on the Kanawha River near Marmet, W.Va., for example, only one barge (or the towboat) can fit in the lock chamber at a time. So the towboat pushes the first barge into the chamber, unhooks it and backs out.

The first barge is then attached to cables and pulled through and out of the chamber ("hailed through," in river terms) after the chamber



A barge enters the lock chamber of Marmet Lock, located near Marmet, W.Va., on the Kanawha River. USCG photo by CDR Kevin Kiefer.

Two barges and towboat back out of Marmet lock chamber (after releasing the first barge into the chamber) on the Kanawha River near Marmet, W.Va. USCG photo by CDR Kevin Kiefer.

water level is raised or lowered to match the river level on the other side of the chamber.

Then the towboat does the same with the next barge and subsequent barges, and, finally, the towboat enters the chamber. The barges and towboat are then reconnected at the other side of the lock chamber.

Disconnecting, reconnecting, and moving cables during the hauling-through process make this one of the most dangerous operations on the river for a deckhand. This process also takes a significant amount of time, so USACE is now building larger lock chambers to help alleviate the concerns of inefficiency and safety.



A Look at Major Marine Events

Major marine event planning, coordination, and execution on the Western Rivers.

by LCDR JESSE STEVENSON
Chief of Response, U.S. Coast Guard
Sector Upper Mississippi River

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What

are marine events, and why is the Coast Guard involved with them? The Code of Federal Regulations defines a regatta or marine parade (also known as a marine event) as an organized water event of limited duration that is conducted according to a pre-arranged schedule. The regulations further state that if a marine event is going to introduce extra or unusual hazards to the safety of life on the navigable waters of the United States, the organizer must notify the Coast Guard.



On the Western Rivers, most events occur in areas defined by narrow channels where navigation may be severely limited. These events require close coordination among the marine event sponsor, the Coast Guard, and other agencies with jurisdiction on the water to ensure that commercial vessels and recreational boats can safely transit through the area while the event is occurring.

Typical marine events include festivals; fireworks shows; fishing tournaments; speed boat races; and rowing, canoeing, kayak, and swimming events. Some of the more notable events on the Western Rivers include:

- The Head of the Ohio in Pittsburgh, Pa., a regatta and festival that draws more than 4,000 rowers from around the country;¹
- Fourth of July fireworks in Nashville, Tenn., which has been previously rated as one of the top eight 4th of July fireworks events in the nation by the American Pyrotechnic Association;²
- The annual Outdoors, Inc. Canoe/Kayak Race and Festival in Memphis, Tenn., the largest canoe and kayak race in the Southeastern United States;³
- St. Paul's Taste of Minnesota, a four-day event with nightly fireworks rated as one of 2007's top ten amazing fireworks displays in the nation by the American Pyrotechnic Association.⁴

Fireworks events, which are often a sub-event within a proposed marine event, create additional risks. Unlike many fireworks displays on more open bodies of water, displays on the rivers require that the barges containing the fireworks shells be strategically placed within the restrictive confines of the river, so that shell fallout does not land on the shore crowds or the boaters watching from the river.



The key to a successful event is involving the local Coast Guard office in the planning process from the beginning. This allows the Coast Guard planners—in conjunction with state, county, and local partners—to identify and solve problematic issues before an event. The small units found throughout the Western Rivers also rely heavily on the support of Coast Guard Reserve personnel to staff boat crews and other key positions during marine events. Reservists provide consistency and valuable experience, including lessons learned from previous events, to improve the current year's



Tall Stacks 2006. Coast Guard 25-foot patrol boats escort the Belle of Louisville through downtown Cincinnati. Photo courtesy Mr. Dave Michaels, Lilburn, Ga.

marine events. The same can be said of the many Coast Guard Auxiliary members who work the events. Their intimate knowledge of the waterways and local players allow for a better coordinated response.

Tall Stacks: Cincinnati, Ohio

Sitting on the banks of the Ohio River, Cincinnati is a city steeped in rich river history. The Tall Stacks Music, Arts, and Heritage Festival celebrates that history, with the neighborhood communities of Newport and Covington, Ky., joining in the celebration with exhibits on both sides of the river. Tall Stacks—which features an average of 18 Coast Guard-certified stern-wheel vessels—drew more than 800,000 visitors,⁵ 117,000 vessel passengers,⁶ and nearly 1,500 recreational vessels⁷ during the October 2006 event.

This impressive five-day extravaganza, scheduled on a three-year cycle, is one of Marine Safety Detachment Cincinnati's largest marine events. Approximately 620 personnel hours were dedicated to pre-planning alone.

During the event, Marine Safety Detachment Cincinnati's six-person active duty and 26-person reserve force was supplemented by Coast Guard members from Sector Ohio Valley, Marine Safety Unit Huntington, Marine Safety Security Team 91102, and Coast Guard Cutter *Osage*. Cincinnati and Columbus-based Navy Reserve units, the Coast Guard Auxiliary, and the Cincinnati Power Squadron also provided assistance. The collocation of the Tall Stacks control center and Coast Guard patrol commander, responsible for the positioning of all law enforcement agency vessels, created a coordinated effort of river traffic control. Their combined efforts facilitated oversight of event boat movement and helped coordinate the movement of up- and downbound towboat and barge traffic. At nearby locks, commercial vessel traffic was given informational flyers detailing the requirements for transiting through the area, as well as radio channels designated for communication to the Tall Stacks control center and Coast Guard patrol commander.

The Coast Guard forces, Ohio Department of Natural Resources, Kentucky Fish and Wildlife, Hamilton County Sheriff, and several other local governmental agencies also oversaw numerous evolutions, including five large fireworks displays, eight sternwheeler boat races, and two boat parades, in addition to nearly 340 individual cruises by the event vessels.⁸

Fair St. Louis

Imagine open-air concerts; hundreds of street vendors and entertainers; a bridge turned into an open-air marketplace, packed with dining areas; and a magnificent 20-minute fireworks display each night. This is what the hundreds of thousands of spectators experience during the annual Fair St. Louis 4th of July celebration

at the foot of the Jefferson National Expansion Memorial Arch—“The Gateway to the West.”

Fair St. Louis officially began in 1981 to commemorate one of the nation’s and St Louis’ most famous historical events—the 1904 World’s Fair. Attended annually by an estimated 500,000 people, spectators witness the sights and sounds of the city, local performers, and St. Louis Cardinals baseball games.⁹ Each night brings live performances on the riverfront, followed by a 20-minute fireworks extravaganza.

Planning for the annual event starts as soon as the current year’s event is finished. Working with multiple agencies, Sector Upper Mississippi River’s marine event coordinator starts identifying any risks that might be associated with the activities planned for the following year. The marine event coordinator uses a risk-based decision making tool to develop ways to mitigate those risks to ensure a safe, fun-filled event.

Fair St. Louis continues to be a huge success, largely due to the great teamwork among Coast Guard active duty, reserve, and auxiliary personnel; state officials such as the Missouri State Water Patrol and Illinois Department of Natural Resources; local emergency responders; and the Fair St. Louis planning committee. Pre-planning and effective use of the RBDM tool help ensure the full integration of all resources.



Tall Stacks 2006. A Coast Guard 25-foot defender-class boat escorts a towing vessel and barges through downtown Cincinnati, passing underneath the Taylor-Southgate bridge. Photo courtesy Mr. Dave Michaels, Lilburn, Ga.

During the 2006 Fair St. Louis, Sector Upper Mississippi River was able to safely coordinate and oversee 18 simultaneous marine events over the 4th of July weekend, providing many hundreds of thousands of spectators the opportunity to safely enjoy their Independence Day celebrations.

Thunder Over Louisville

Thunder Over Louisville is the largest fireworks event in the country.¹⁰ It is held two weeks before the Kentucky Derby to mark the official beginning of the Kentucky Derby festival. More than 1.5 million people attend the festival during the two weeks between Thunder and the Derby, generating over \$93 million dollars in the local community. Thunder itself brings in



Tall Stacks 2006. The fireworks show serves as a backdrop for Cincinnati’s historic Roebling Suspension Bridge. Photo courtesy Mr. Dave Michaels, Lilburn, Ga.



Cincinnati Riverfest 2006. View from the Coast Guard patrol command. USCG photo by MST2 Andrea Heming.

\$31 million in one day. Of that money, a significant portion goes to charitable and non-profit organizations such as Easter Seals, the Kentucky Center for the Arts, and the Louisville Science Center.¹¹

Although the fireworks show is the major attraction for Thunder, it is actually an all-day event, with an air show by the Air Force Thunderbirds or the Navy's Blue Angels and demonstrations by other branches of the military, public safety agencies, and civilians. The event draws hundreds of thousands of spectators along the Kentucky and Indiana banks of the Ohio River.

Thunder began in 1990 in conjunction with a concert by Janie Fricke that was attended by 35,000 people. The next year the fireworks show moved to its present location at Waterfront Park. The event quickly grew, especially with the involvement of the impressive Zambelli Fireworks company. By 1996, more fireworks shells were being expended in the first minute than were used in the entire first show. In 2007, the record crowd of over 800,000 was treated to more than 60 tons of fireworks, accompanied by a synchronized soundtrack broadcast over local radio, and lasted for twenty-eight minutes.¹²

The air show, which began in 1992, gathered enough national attention to be designated as one of two main events for the Air Force's 50th anniversary celebration in 1997. More than 125 military aircraft performed that year, making it the largest combined fireworks and air show in the United States. The air show continues to attract more than 100 aircraft, skydivers, and aerobatic

or stunt teams every year, along with a host of military equipment on display on the ground, making it one of the top five air shows in the United States.¹³

Of course no show of this size can be put on without a tremendous amount of planning and organization. Thunder planning for the next year begins almost before the echoes of the show have faded on event night. Meetings are held al-

most year-round to help garner sponsors, partners, and participants. The Coast Guard is involved in many of these meetings, especially with law enforcement, rescue agencies, and event organizers, to help delineate each agency's responsibility on event day.

Since Thunder Over Louisville happens in late April, the river is often higher than normal and swift currents, debris, and drift are common. As a result, the week leading up to Thunder is used by the Coast Guard to emphasize safe boating awareness. Public outreach includes radio and newspaper spots, along with a joint press conference with all the agencies on the day before the event.

The river is closed in the early afternoon on event day. The Coast Guard patrol commander then coordinates boat traffic for each agency through the "air box," the zone where the aircraft are actually over the river. When opportunities arise, the Coast Guard patrol commander may open the river to traffic, but these opportunities are generally very brief. Throughout the closure, Coast Guard, state, and local law enforcement agencies patrol the area, ensuring no one proceeds below it without proper clearance. Once the fireworks end, the river is opened to traffic and the Coast Guard and other agency boats begin to help clear out the spectator area.

About the authors:

LCDR Stevenson is chief of response, Sector Upper Mississippi River. He enlisted in the Coast Guard, achieving the rank of MKC before receiving his officer's commission in 1995. He has a bachelor's degree in industrial technology and a master's in quality systems management. Lcdr Stevenson previously served as chief of marine environmental

response at Marine Safety Office San Francisco Bay, Alameda, Calif.

MST3 Haven Miller is the marine event coordinator for Sector Upper Mississippi River. Prior to her current assignment, she served at Station Ocean City, MD, and Marine Safety Office St. Louis. In her seven years of service, she has been awarded three Commandant Letters of Commendation, a Meritorious Team Commendation, a Presidential Unit Citation, a Humanitarian Service Medal, a National Defense Service Medal, a Global War Terror Service Medal, two Good Conduct Medals, and the Transportation 9-11 Ribbon.

LT Kurt Van Hauter is the supervisor of Coast Guard Sector Ohio Valley's boat facility in Louisville, Ky. His previous assignment was at Marine Safety Office/Group Portland, Ore. Prior to attending OCS, LT Van Hauter served as a marine science technician at Marine Safety Office/Group Philadelphia, Pa.; Air Station Kodiak, Alaska; naval technical training unit, Keesler Air Force base, Biloxi, Miss.; and as a boatswain's mate third class at Station Stillpond, Worton, Md.

LT Heather Hanning is the supervisor of Marine Safety Detachment Cincinnati, Ohio. Her previous assignments include Sector Mobile, Ala.;

Coast Guard headquarters marine safety systems development; and prior to attending Officer Candidate School, the USCGC Gentian, Miami Beach, Fla., serving as boatswain's mate third class.

Endnotes:

1. Elwin Green, "It's the Boating Life for Me," Pittsburgh Post-Gazette, July 16, 2006, <http://www.post-gazette.com>.
2. Judy Sarles, "July Fourth Celebration Expanding in Nashville," Nashville Business Journal, June 2, 2005, <http://nashville.bizjournals.com>.
3. Press release, <http://www.outdoorsinc.com>.
4. <http://www.americanpyro.com/News%20Releases/TopTen03.pdf>.
5. Tall Stacks Committee staff member Mike Smith.
6. Calculated based on passenger numbers reported to MSD Cincinnati from Tall Stacks Committee staff.
7. Estimate from CG MSD Cincinnati Patrol Command.
8. Calculated by MSD Cincinnati based on cruise passenger numbers reported from Tall Stacks staff.
9. <http://www.celebratelouis.org>.
10. <http://www.ThunderOverLouisville.org/show/default.asp>.
11. <http://www.ThunderOverLouisville.org/pages/economicimpact.asp>.
12. <http://www.ThunderOverLouisville.org/>.
13. <http://www.ThunderOverLouisville.org/show/show-planes.asp>.

RISK-BASED DECISION MAKING

One of the most important tools used to plan marine events is risk-based decision making (RBDM). Oftentimes, original event proposals have risk factors that may present unreasonable risks to the public.

Working with the event planning staff, the Coast Guard must identify those risks and develop strategies to reduce or eliminate them. To help in this process, Sector Upper Mississippi River developed a specific RBDM tool for marine events.

The RBDM tool enables the unit to evaluate almost every aspect of a marine event. It provides a logical and defensible basis for making decisions and helps to identify the greatest risks and prioritize efforts to minimize those risks to an acceptable level if they cannot be eliminated altogether.

The tool can be used to calculate a risk score to determine if a marine event sponsor has appropriately addressed safety and security risks. It also provides guidance to the Coast Guard on the numbers of assets that may be required to monitor the event.

For more information on this RBDM tool, please contact MST3 Haven Miller, Marine Event Coordinator, U.S. Coast Guard Sector Upper Mississippi River.



Cincinnati Riverfest 2006. MSD Cincinnati's 23-foot UTL patrols recreational traffic to ensure the river remains passable. USCG Photo by MST2 Andrea Heming.



The Great Steamboat Race

by LT KURT VAN HAUTER

Boat Facility Supervisor, U.S. Coast Guard Sector Ohio Valley

As long as there have been steamboats, there have been captains who wanted to race them and spectators to watch. No less an authority on steamboats than Mark Twain opined:

“I think that much the most enjoyable of all races is a steamboat race; but, next to that, I prefer the gay and joyous mule-rush. Two red-hot steamboats raging along, neck-and-neck, straining every nerve—that is to say, every rivet in the boilers quaking and shaking and groaning from stem to stern, spouting white steam from the pipes, pouring black smoke from the chimneys, raining down sparks, parting the river into long breaks of hissing foam—this is sport that makes a body’s very liver curl with enjoyment.”

“Life on the Mississippi,” by Mark Twain

In 1963, a Louisville, Ky. judge, Marlow Cook, challenged the *Delta Queen*’s owners to a race against the newly purchased *Belle of Louisville*. The *Delta Queen* won the inaugural race, but the *Belle*’s immediate request for a rematch began what is now an annual event—the modern day Great Steamboat Race.

Other boats have joined in the race over the years and won, but the two original boats hold the records. In 2007, the *Belle of Louisville* won for a 22nd time, remaining the series leader. The *Delta Queen* has been victorious in 19 races.

In 1990, both vessels were added to the National Historic Register, and are two of only six authentic steamboats still in operation. Though now considered “historic,” these commercially operating passenger vessels are required to hold a current Coast Guard certificate of inspection.

The Great Steamboat Race is one of 70 events that make up the Kentucky Derby Festival, and is traditionally run on the Wednesday before the derby. The course has been modified to accommodate high water a few times, but the event has only been cancelled one time. It traditionally runs from the Second Street Bridge, near the wharf in downtown Louisville, past the crowd gathered on the great lawn, up to Six Mile Island, and back to the bridge. Coast Guard Sector Ohio Valley establishes and enforces safety zones during the race to ensure that other vessels do not enter the course. The race receives tremendous attention, with crowds gathered along both banks of the Ohio River, and live coverage from television and radio stations. Race parties are common in the days leading up to the event.

The winner earns a year’s worth of bragging rights in addition to the highly coveted “Golden Antlers.” In the early days of steamboats, the fastest boats on the river sported a pair of gilded elk antlers as a symbol of prowess. As noted in “She Takes the Horns, Steamboat Racing on Western Waters,” by Frederick Way, Jr.:

“Sometimes these emblems were mounted on top of the big bell on the hurricane roof, sometimes on the front of the pilothouse; always in plain view, at any rate, for all to observe. These decorative antlers were much coveted. They were a brag to all and sundry, usually that the owning boat had ‘shortened the pegs’ in a speed sprint between two major cities—that she had done it honestly and in the presence of qualified witnesses, and with no ‘time out’ deductions for any delay.”

About the author:

LT Kurt Van Hauter is currently assigned as the supervisor of Coast Guard Sector Ohio Valley’s boat facility in Louisville, Ky. He was previously assigned to Marine Safety Office/Group Portland, Ore. Prior to attending OCS, LT Van Hauter served as a marine science technician at Marine Safety Office/Group Philadelphia, Pa.; Air Station Kodiak, Alaska; Naval Technical Training Unit, Keesler Air Force Base, Biloxi, Miss.; and as a boatswain’s mate third class at Station Stillpond, Worton, Md. Before joining the Coast Guard, LT Van Hauter served in the U.S. Navy at Amphibious Construction Battalion Two, Little Creek, Va., as a boatswain’s mate 2nd class.

Bibliography:

www.kdf.org/events/event-steamboat.asp
www.thunderoverlouisville.org
www.steamboats.com

Baseball in the Heartland

Western River Coast Guard units face challenges providing safety and security during America's favorite pastime.

by LT MICHAEL ANDERSON

Chief, Response Department, U.S. Coast Guard Marine Safety Unit Pittsburgh

MR. JAMES HOLMAN

District Chief, City of Pittsburgh Emergency Medical Services/River Rescue Division

MR. TODD EPPERSON

Port Security Specialist, U.S. Coast Guard Sector Upper Mississippi River

What do Pittsburgh's PNC Park, Cincinnati's Great American Ballpark, and St. Louis's Busch Stadium all have in common? The answer is not that they all serve \$5 draft beers and foot-long hot dogs. Although that may be true, the answer is that they are all located on the banks of a dynamic and extremely diverse stretch of the Western Rivers System.

The Mississippi, Ohio, Missouri, and other tributary rivers that form this river system play host to many other professional sports on their shores, but perhaps none more prominent than the great American pastime—baseball. Because many of these real-life fields of dreams are in such close proximity to the waterways, they pose unique safety and security concerns for the Coast Guard units that serve those communities.

Speaking of "Field of Dreams," the movie set for this wildly popular film is located in the heartland of the country, about 15 miles west of the Mississippi River in Dyersville, Iowa. In the movie, the image of "Shoeless" Joe Jackson (who allegedly conspired to throw the 1919 World Series) appears from the cornfields. To many baseball fans, it is a place that represents the link between the heartland and the game itself.

Baseball, Major and Minor

Other baseball fans consider another western river town as the solid, reinforced core of baseball—St. Louis,

Mo. The St. Louis Cardinals have won 15 pennants and more world championships (nine) than any other National League team. Despite a much smaller fan base, the Cardinals have actually outdrawn the New York Yankees in fan attendance over the past 15 seasons. Perhaps more importantly, this western river town made modern-day sports more enjoyable by introducing the hot dog at the 1904 World's Fair.¹

The shorelines of the Western Rivers are peppered with professional baseball stadiums—some big, some small—and towns that rely on the baseball industry not only for the economic gains and enterprise of the sport, but for the departure from the daily grind and routine trappings of ordinary life. Minor league baseball stadiums such as John O'Donnell Stadium in Davenport, Iowa, and Riverview Stadium in Riverview, Iowa, are both located on the banks of the Mississippi River.

Louisville, Ky., the home of Coast Guard Sector Ohio Valley, boasts an important claim to baseball fans and players—it's the home of the Louisville Slugger baseball bat company. This adds to the rich history of baseball in the heartland of America.

When the Majors Come to Town

Major league baseball (MLB) is not only extraordinarily popular, it's also big business. With big business comes high-profile events like the World Series and All-



Star games. Both of these events have occurred at venues located on the Western Rivers system—Busch Stadium, St. Louis, and PNC Park, Pittsburgh, respectively. Both of these events created significant operational, tactical, and logistic challenges for Coast Guard units responsible for maintaining maritime safety and security on the Western Rivers. Additionally, each required extensive interagency, intergovernmental, and public and private sector cooperative efforts. This effort culminated in a jointly created framework used to communicate threats, identify risks, and coordinate resources to mitigate threats and vulnerabilities.

In hosting the MLB All-Star game and related events (including the home run derby competition), the City of Pittsburgh Police Bureau and PNC Park officials took the lead in developing the overall security plan. Understanding the physical layout of PNC Park and the expected fan base were important factors.

PNC Park, located across from downtown Pittsburgh on the banks of the Allegheny River, has a capacity of 38,496. The majority of ticket holders for All-Star game events were from outside the greater Pittsburgh area. The ballpark's prime location along the north shore of the Allegheny River takes advantage of scenic vistas of the downtown skyline and riverfront and offers pedestrian and riverboat access, creating an exciting and dramatic urban sports venue.

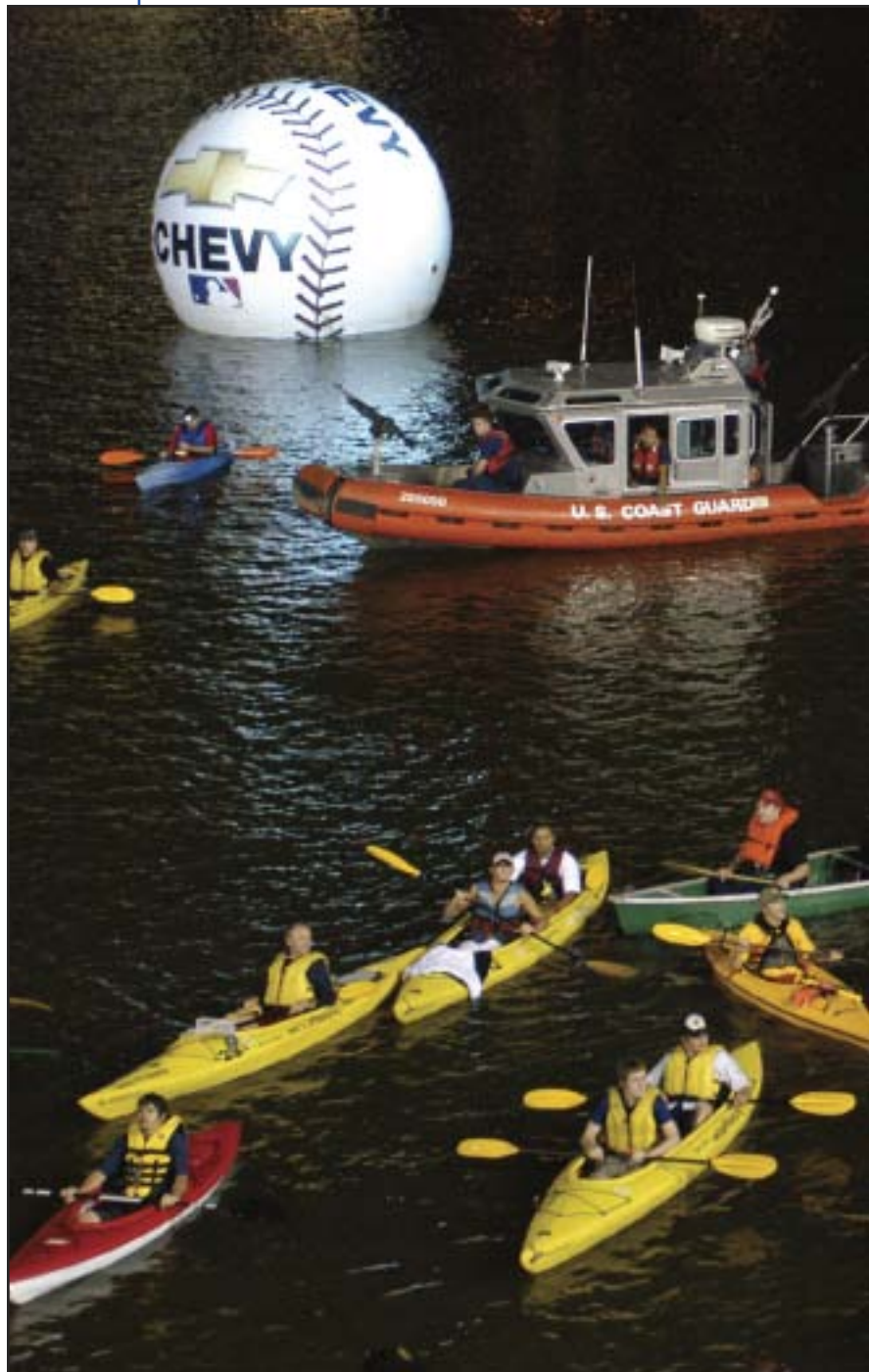
Coast Guard Marine Safety Unit (MSU) Pittsburgh and the City of Pittsburgh River Rescue Unit coordinated closely to provide maritime safety and security for the five-day event, and co-chaired the maritime operations working group. Chief Robert McCaughan, head of Pittsburgh's River Rescue Unit and emergency medical services; partnered with CDR Steve Wischmann, commanding officer of MSU Pittsburgh; and former commanding officer, CDR Wyman Briggs, to develop the framework for security operations. It

Coast Guard 25-foot defender-class boats maintain safety and security during the 2006 major league baseball All-Star game home run derby competition on the Allegheny River. Kayakers are in position to retrieve balls hit out of PNC Park and into the river.

brought the largest contingent of Coast Guard security forces ever to the Pittsburgh region for a security-related event. The framework also engaged full use of the National Incident Management System's Incident Command System and unified command.

In all, Coast Guard forces from eight different commands—including Coast Guard K-9 and dive teams—participated in safety, security, and support operations for the event:

- MSU Pittsburgh,
- U.S. Coast Guard Cutter *Osage*,
- Marine Safety and Security Team Galveston,
- MSST New York,
- MSST Kings Bay,



- Maritime Security Response Team Chesapeake,
- District Eight Public Affairs staff,
- Atlantic Area staff.

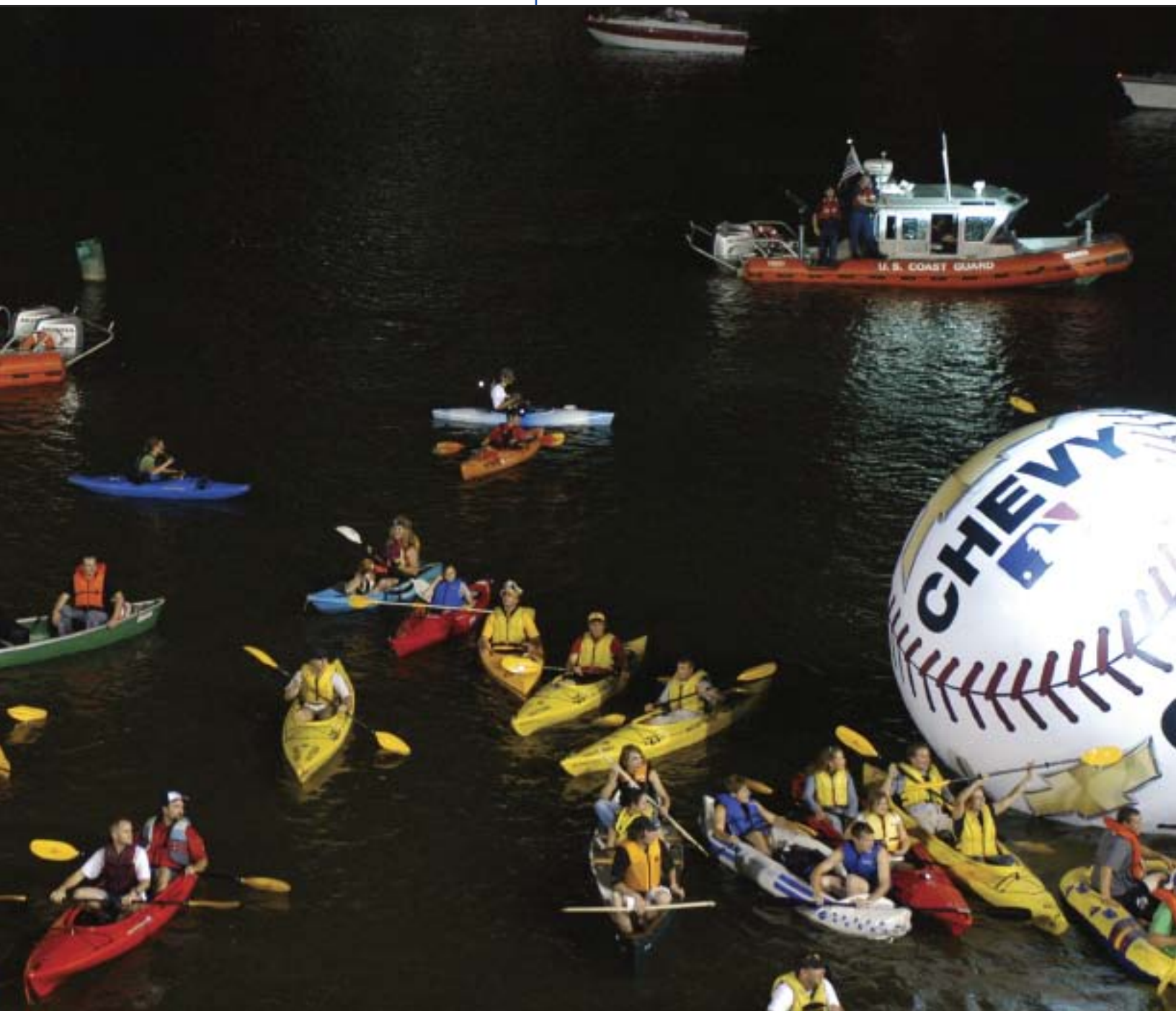
Coast Guard forces, working closely with Pittsburgh River Rescue resources, were responsible for conducting more than 300 security sweeps and security spot-checks of passenger and recreational vessels, and more than 40 Coast Guard and Pittsburgh River Rescue dive sorties on commercial vessel hulls and sea walls. They also executed over 35 passenger vessel physical security escorts.

All-Star AMSTEP

To prepare for the extraordinary safety and security requirements, Coast Guard forces and federal, state, and

local law enforcement agencies participated in an area maritime security training and exercise program (AMSTEP) table top exercise (TTX) sponsored by the Coast Guard and hosted by MSU Pittsburgh. The exercise took place three months prior to the All-Star game and was a key element in enhancing—and in some cases, creating—strong partnerships across a broad spectrum of stakeholders.

The objectives of the All-Star game AMSTEP TTX were consistent with many of those emphasized in the overall Pittsburgh area maritime security committee plan and included becoming aware of vulnerabilities, developing strategies to reduce risk, implementing procedures to manage consequences if needed, improving



communication, and conducting training to increase responder/ personnel preparedness.

Local, state, and federal agencies in the greater Pittsburgh area had already established a long and successful history of working together and maintaining strong partnerships. A by-product of the All-Star game operations was the further enhancement of those relationships and development of protocols and strategies to prepare for similar events in the future.

World Series Preparations

In preparing for three World Series games at St. Louis's Busch Stadium, Coast Guard Sector Upper Mississippi River (SUMR) faced many of the same operational, tactical, and logistic challenges as those experienced by MSU Pittsburgh during the All-Star game. One major difference between the two events was that SUMR had significantly less time to prepare. With the All-Star game scheduled as far as 12 months in advance, officials in Pittsburgh had more time to plan, acquire resources, and test contingencies. Once it had been determined that St. Louis would host at least one game of the World Series, city, state, and federal entities had just a few weeks to bolster existing public safety and security plans and establish a comprehensive plan, tailored to meet the needs of MLB and the World Series event.

In much the same way, Coast Guard forces in Pittsburgh worked with the City of Pittsburgh to use the National Incident Management System to manage All-Star game activities. SUMR coordinated closely with the St. Louis City Emergency Management Agency (CEMA) to stand up a unified command at CEMA headquarters. SUMR surged to meet unified command needs and provided active duty and civilian personnel support throughout the three games at Busch Stadium.

Busch Stadium's close proximity to area highways, interstates, and the Mississippi River compounded the importance of maintaining full visibility to all asymmetrical threats. Plans were put in place to closely monitor all hazardous material and extremely hazardous cargo transits on the Mississippi River in the vicinity of St. Louis, as well as St. Louis's light rail mass transit systems and area bridges.

Coast Guard Captain of the Port (COTP) authority was used both in Pittsburgh and St. Louis to establish temporary safety zones on the waters both up- and down-river of PNC Park and Busch stadiums as well as

adjacent to the ballparks during these high-profile, nationally televised events. The defender-class boat was the primary Coast Guard platform used for enforcing these safety zones.

St. Louis city organizers incorporated COTP authority into their three-phased security approach to prevent hazardous cargos from transiting the area during peak risk times. Additionally, and in the spirit of great cooperation, industry representatives were extremely receptive to Coast Guard requests to move hazardous cargos through each port area in a manner and timeframe that reduced risk to each venue.

The seamless integration of local, state, and federal response and law enforcement agencies during the All-Star game and World Series resulted in incident-free events enjoyed by thousands of enthusiastic baseball fans. Both events were successfully managed by integrating a combination of facilities, equipment, personnel, procedures, and communications operating within a common organizational structure. Coast Guard units leveraged existing partnerships with stakeholders and, in some cases, built new ones. Success was a result of proper planning, training, and mission execution—things the Coast Guard is well-adept at performing.

During pre-game meetings and after the events, major league baseball and organizers in Pittsburgh and St. Louis lauded the combined efforts of many different organizations, particularly the Coast Guard, for outstanding support. By all accounts, the Coast Guard and its partner agencies hit a home run.

About the authors:

LT Michael Anderson has served in the Coast Guard for 19 years. He served as a helicopter rescue swimmer prior to attending Officer Candidate School in 1998. He has since completed a joint staff and two tours in the marine safety field. He holds a master of science degree in business ethics from Duquesne University.

Mr. James D. Holman is the administrative chief of the City of Pittsburgh's River Rescue Division, which provides first responder port security and dive rescue service to Pittsburgh's three rivers. He sits on the area maritime security committee and other public safety committees, and co-chaired port security operations for the 2006 All-Star games. He is a 32-year veteran of the City of Pittsburgh emergency medical services.

Mr. Todd Epperson is currently working as the port security specialist for Sector Upper Mississippi River in St. Louis, Mo., and has been with the Coast Guard for one year. Mr. Epperson retired after 25 years of service from the Air Force as a security specialist. He graduated from Webster University in 2005 with a master of arts degree in business and organizational security management.

Endnote:

¹ <http://espn.com>.

Rivermen's Lingo

by LT MARK SAWYER
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People have settled along rivers largely due to the opportunities river-related commerce creates. The rivers' importance to commerce is critical, and the individuals that work and live on the rivers are just as important. They are central to ensuring that commerce moves in the most efficient manner. These individuals are accustomed to long workdays aboard barges and vessels and are accustomed to the rigors and hazards of working on the river.

They have a very proud heritage steeped in tradition. The skills of guiding vessels safely around bends, nav-

igating through narrow locks, and operating in very high, swift water have been passed on from one generation to the next. They proudly share the history of the rivers, including the first sternwheeler, the Louis and Clark expedition, and life before locks and dams.

Because of the unique operating environment, these individuals consider themselves distinct from the mariners that operate on the "blue water" or oceans. In fact, they are proud to be called "rivermen" or "brown water sailors." Their preferred title is not the only thing that separates them from the rest of the maritime industry.

UNIQUE TERMS USED BY RIVERMEN

Term	Definition
Acorn Float	A wooden float, shaped like an acorn, measuring about eight inches in diameter by a foot long, used as a life preserver on the old steamboats before personal flotation devices and work vests were invented.
After Watch/Forward Watch	The "after watch" is the working shift on towboats from 12 a.m. – 6 p.m. The "forward watch" is the working shift on towboats from 6 a.m. – 12 p.m.
Backwater	Water that backs up into a tributary when the river rises.
Bull Roaster	A towboat cook.
Chasin' Frogs	Running aground.
Choke a Stump	Moor to a tree on the bank.
Clorox Bottle Raise	Sudden increase in flow after a dry spell that brings out a lot of drift.
Drift	(1) To float with the current; (2) motion of a vessel caused by current or wind; (3) floating debris in the river; (4) distance between the hook block and boom sheaves of a crane.
Face Up	To bring the head of the boat up against the stern of the tow and secure it with the face wires.
Face Wires	Steel cables from the head winches or capstans used to connect the tow boat to the barges.
Lower Gauge	Water level gauge on the downstream side of a lock.
Mule Train	Maneuver sometimes used in ice, where the barges are pulled single-file behind the towboat.
Splitting on the Head	Facing up with the boat straddling two barges.
Trip Pilot	A pilot employed on a single trip, rather than employed on a regular basis.
Upper Gauge	Water level gauge on the upstream side of a lock.
Yawl	Small dingy or tender carried aboard towboats.



They have developed a whole new vocabulary unique to the river industry. One can quickly identify a riverman by his or her nomenclature. Understanding the culture and vocabulary brings added respect for these rivermen and greater appreciation for their heritage.

There are certain terms one should be familiar with when talking with rivermen. For example, calling a riverman's vessel a "tugboat" will cause the riverman to cringe. This simple slip identifies oneself as a "blue water" person with little knowledge of the rivers. In an attempt to develop a better rapport with the river industry, here are some important terminology differences between the river and coastal maritime communities.

TOWBOATS vs. TUGS

In the May 2007 issue of *Workboat*, an article entitled "Tug or Towboat: Which Is It?" helps to clarify the difference. The author, Mr. David Webster, explains that "a towboat is flat on the front, not a V-bow, and has push knees or toe knees to 'face up' to the end of a barge or barges." In other words, tugs are used primarily on the coast to assist vessels coming into/out of port, while towboats are used to push barges. Towboats are used mainly on the inland rivers; therefore, a riverman's vessel is called a towboat.

PILOTHOUSE vs. BRIDGE

A "pilothouse" is the common navigational bridge of a towboat. It is the location where the master or pilot navigates the vessel. If one uses the term "bridge" on the rivers, the rivermen will be looking for a structure that spans a waterway, such as a highway or railway bridge.

HITCH vs. CONTRACT

When one asks a riverman how much longer he has on the towboat, he will give the days left on his "hitch." A hitch varies depending on the company; typically they are 20 to 30 days. A "contract" is usually reserved for deep-draft vessels, when a mariner signs a contract to serve on a vessel for a specified period of time.

TOWBOAT PILOT vs. BAR or HARBOR PILOT

A "towboat pilot" is a member of the towboat's crew and is the officer in command on the after watch (12 a.m. - 6 p.m.). A towboat pilot holds a Coast Guard license as a mate (pilot) of towing vessels, whereas a bar or harbor pilot holds a first-class pilot license. Furthermore, a bar or harbor pilot is assigned to a vessel temporarily to help the crew onboard navigate a particularly hazardous area. The bar or harbor pilot has an intimate knowledge of the area in which the vessel is operating, moreso than the crew onboard the vessel.

Bar or harbor pilots are often used to bring deep-draft vessels into and out of a coastal port.

WHEEL vs. PROPELLER

On a towing vessel operated on the rivers, the term "wheel" is used to describe the propeller, the steering wheel, or a paddle-wheel. On the coast, mariners do not use the term wheel, unless occasionally referring to the helm. Coastal mariners call the fan-like devices that move the vessel along by lift created when the angled blades turn in the water as the "propellers" or "screws." Very seldom will you hear rivermen call the propellers anything but wheels. This term originated from paddle-wheels, which were used as the main source of propulsion on the rivers, long before propellers.

About the author:

LT Mark Sawyer is chief of prevention at Marine Safety Unit Huntington. He has eight years of marine safety experience and is a graduate of Officer Candidate School. He holds a master of science in occupational safety and health and a master of business administration.

Acknowledgement:

A special thanks to Mr. David Smith, Madison Coal and Supply, for providing resources for this article.

One of the most famous rivermen was Samuel Clemens—better known as Mark Twain—who adopted his new name from a common term used on the rivers.

Samuel Clemens grew up in the St. Louis, Mo., area and served as a steamboat pilot before becoming an author. While piloting steamboats, he frequently called to the leadsman to check the water's depth for safe travel. The leadsman would use a leadline to determine water depth and the type of material that comprised the bottom or riverbed.

A 30-foot-long line was attached to a pipe filled with lead. The leadsman would relay the water's mark on the line to the pilot. A common mark was two fathoms, or 12 feet, which was commonly called "twain." When the leadsman called out: "mark twain," it indicated the water depth was 12 feet, a safe depth to travel.

A Proud Heritage

*History of the rivers
and river museums.*



by MR. DAVID L. DELICH
U.S. Coast Guard Auxiliary, Department Chief, Liaison Division, National Staff

LT CHARLOTTE A. KEOGH
Chief, Prevention, U.S. Coast Guard, Marine Safety Unit Paducah

"I loved the profession far better than any I have followed since," he long afterward declared, "and I took a measureless pride in it," Samuel L. Clemens said, commenting on his career as a steamboat pilot on the Mississippi River.



"The dreamy, easy, romantic existence suited him exactly. A sovereign and an autocrat, the pilot's word was law; he wore his responsibilities as a crown. As long as he lived, Samuel Clemens would return to those old days with fondness and affection, and with profound regret that they were no more."

- from "Mark Twain: A Biography," Albert Bigelow Paine

Such was the power of "Ole Man River" and respect for the men that used the river for commerce and transportation in the early days of the nation. All of the major cities along America's westward expansion were located on these natural water highways. St. Louis, Memphis, Vicksburg ... mention the names of these cities and the first thoughts are of steamboats, cotton, and legendary exploits on the rivers.

Vessels like the *Delta Queen*, *Mississippi Queen*, and *Natchez* conjure up thoughts of men in long white suits with ladies in hoopskirts at their sides, strolling the expansive decks of these marvelous machines. Overseeing it all was the river pilot, master of the vessel, looking down from his lofty pilothouse, lord of all he saw.

Early Exploration and Discovery

The early French explorers looked upon the great rivers as a means to further explore the North American continent. They saw rivers as an easy way to travel, which was a radically different view than the Spanish who

preceded them. Spanish explorers found the great rivers to be obstacles; movement of horses, supplies, and men over the rivers was not easy. As a result, most of the early Spanish explorers simply crossed them or bypassed them entirely before moving on to pursue treasure.

The French, following the travels of Marquette and Joliet and others, established outposts along the rivers, trading with the Indians, acquiring beaver, fox, and muskrat pelts in exchange for simple beads, cloth, and iron tools. These outposts eventually evolved into the towns and commercial centers that exist along the major rivers today. Cincinnati, Pittsburgh, St. Louis, Memphis, and New Orleans all began as riverfront trading posts and inland ports.

As people began to move west, they needed basic goods for survival. Merchants brought these items west, selling gunpowder, nails, sugar, and other necessities off of flat-bed boats on the river. These boats had no propulsion systems; they essentially went where the



river current took them. The flatboat merchants traded for furs, crops, or other items on the downward trek to the mouth of the river. The boat would then be sold, along with the cargo, and the cycle would repeat.

In 1803, the Louisiana Purchase opened up a new frontier and the rivers became more important as transportation systems. The real breakthrough in this effort was the introduction of steam power for river vessels. Now people and goods could go upstream (against the current). Steam-powered ferries shuttled people, horses, oxen, and goods to where they were needed, regardless of river current. Towns began to sprout up along the lesser rivers, such as the Missouri, Cumberland, and Tennessee Rivers. The rivers became “commercial highways,” fueling the westward expansion and the growth of the nation.

and Natchez, establishing these cities as inland commercial ports. As the Civil War loomed on the horizon, southern states felt that the cotton trade with Europe and its dependence on Southern cotton would strengthen their cause. The Confederacy believed that the commercial ties with Europe would lend legitimacy to its cause, and these commercial allies would help establish its claims to acceptance as an independent nation. The European nations developed other suppliers, though, and the commercial and diplomatic ties with the Confederacy were essentially over.

As the Civil War heated up, the Union forces used the rivers to move troops and equipment. The Union blockade of southern ports shut down the inland commerce on the rivers, and the rivers were used to divide up the Confederacy, hastening its defeat. The Union won battles at Shiloh, Chattanooga, Memphis, Vicksburg, and

Mobile due to its control of the rivers and its ability to move large numbers of troops by riverboat. The Confederacy, even with its innovations of iron-clad gunboats and an early submarine, could not stem the Union tide on the rivers.

Reconstruction and Engineering

After the Civil War, the steamboats returned to the rivers, continuing the commerce that flourished before the war. The U.S. Army Corps of Engineers

(USACE) then took over the rivers, starting projects to improve navigation and make the rivers bend to man’s will. USACE built levees to contain the river during floods, protecting the cities along the flood plains. However, some hydrological projects would alter the flow of the river in unexpected ways, creating oxbows (U-shaped curves in the river) where none had existed before, as well as creating new flood plains, which threatened riverside towns.

Built in 1927 for the U.S. Lighthouse Service, the USLHS Willow was one of the sturdiest and statliest riverboats afloat. She became a commissioned Coast Guard cutter upon the merger of the Lighthouse Service with the Coast Guard in 1939. Photo by Esther F. Cohn.



War and Commerce

The rise of cotton as the major commodity for the Southern economy created a need for transport to the Southern seaports, where the cotton could be shipped to European factories. Additionally, slaves from the Southern ports were transported back up the rivers to work the cotton plantations.

Steamboats with decks loaded with cotton bales were a common sight in cities such as Memphis, Vicksburg,

Rivers were also viewed as resources for the towns and cities along their banks. Sewage and runoff were discharged into the rivers, while, ironically, the rivers were usually a source of a city's drinking water. Cholera and yellow fever epidemics struck these cities regularly.

A New View of the Rivers

The new century brought significant changes to the rivers. The major cotton trade had been replaced by trade in aggregate, coal, sand, wood, and agricultural products. These new cargos, often low-value materials transported in bulk on barges at a low cost, turned the rivers into major highways for the transport of middle-American goods. As the rivers were used more and more, a system had to be developed to regulate the traffic. USACE was initially tapped to develop such a system, but responsibility was turned over to the Commerce Department and later to the U.S. Coast Guard.

America's rivers were the focus of the environmental revolution of the 60s, 70s, and 80s. People were becoming aware of the rivers as ecosystems, studying their wildlife and cycles, which revealed the damage resulting from using the rivers as sewers. Some rivers, like the Ohio, were considered dead, containing no aquatic wildlife, with toxic levels of chemicals in the water. Any environmental spills, runoff, and industrial discharge into rivers were publicized, with heavy fines for violators. Rivers were cleaned up, wildlife returned, and the Coast Guard was charged with the environmental mission to protect and police the rivers.

The rivers have always been an integral part of our nation's economy, providing the means to travel and conduct business. They are also, of course, an integral part of our nation's ecosystem. For additional information on the Mississippi River visit <http://www.experiencemississippiriver.com/>.

About the authors:

Mr. David L. Delich, DVC-BL, USCG Auxiliary, is the president and chief executive officer of BLW Group, Inc., a process engineering and equipment firm in Memphis, Tenn. He has been a member of the USCG Auxiliary for over eight years, and is on the national staff as a division chief in the department of boating. A Vietnam War veteran, he served in the U.S. Air Force for 13 years.

LT Charlotte A. Keogh is a team leader and Prevention chief at Marine Safety Unit Paducah. She works as an inspector and investigator and has more than 21 years of active duty enlisted/officer service.

Bibliography:

Mike Gillespie, "Wild River, Wooden Boats: True Stories of Steamboating and the Missouri River," Heritage Press, 2000.
Gene Eric Salecker, "Disaster on the Mississippi: The Sultana Explosion, April 27, 1865," U.S. Naval Institute Press, 1996.
Eddy Harris, "Mississippi Solo: A River Quest," Owl Books, 1998.

The Sector Ohio Valley Seal

Honoring the past on today's seal.



U.S. Coast Guard Sector Ohio Valley was formed on June 2, 2005, from the combination of Group Ohio Valley and Marine Safety Offices Huntington, W.Va.; Louisville, Ky.; Paducah, Ky.; and Pittsburgh, Pa. To symbolize that historic event, the inaugural sector commander, CAPT John R. Bingaman, commissioned a unit seal to proudly represent the many charges assumed by the new command.

The Coast Guard's rich history throughout the Ohio valley includes the first and only U.S. Lifesaving Station on the Western Rivers, which was stationed near the falls of the Ohio River in Louisville, Ky. The station's representation on the seal signifies the Coast Guard's long heritage and ongoing missions, specifically the sector's role as search and rescue coordinator on the Western Rivers.

The 25-foot "defender-class" boat represents the Coast Guard's present and future, as well as its multimission service to the nation that includes maritime security, law enforcement, and recreational boating safety.

The green and red buoys signify the numerous aids to navigation that are maintained by the sector's six river tenders, marking the best channel in a dynamic river that constantly presents unique challenges to mariners.

The clean and casualty-free river represents missions that include environmental protection, commercial vessel safety, and waterways management, including Vessel Traffic Service Louisville.

And finally, the 10 gold stars represent each of the states in the nation's heartland that comprise the sector's area of responsibility.

Sector Ohio Valley personnel take pride in working closely with these states, as well as with local and federal agencies, community representatives, and industry partners across the region to ensure that the Western Rivers transportation system remains efficient and viable for multi-purpose use. As noted by CAPT Bingaman in his commissioning address to the crew, "Sector Ohio Valley personnel personify maritime professionals working with maritime professionals."



River Museums

There are a number of museums dedicated to river history. For example, the Ohio River Museum in Marietta, Ohio, is dedicated to the “golden age” of steamboat travel on the river. This museum uses models and pictures to depict what it was like to travel on the river. Museum information may be found at <http://www.ohio-history.org/places/ohriver>.



Children interact with the barge loader exhibit at the Paducah River Heritage Museum. Photo courtesy of Julie B. Harris, executive director.

The Paducah River Heritage Museum, located in Paducah, Ky., at the confluence of the Ohio and Tennessee Rivers, is housed in the oldest antebellum building in the city. It was established in 1988 and hosts more than 15,000 visitors a year. The museum features interactive displays of dams, locks, and barge operations of the present day. Museum information may be found at <http://www.riverheritagemuseum.org/>.

The Tunica River Park Museum is the newest, and is located in Tunica, Miss., 20 miles south of Memphis. This museum officially opened in March 2004 and receives approximately 50,000 visitors a year. The museum shows the history of the river from early exploration to the present and includes an aquarium and wetlands exhibit. A new exhibit is planned for 2008 that will feature the role of the Coast Guard on the rivers and how the river system is regulated and protected. Museum information may be found at <http://www.tunicariverpark.com/museum.asp>.



The Mississippi aquarium is a favorite part of Tunica's new River Park Museum. Photo courtesy of Claire Pittman, public relations manager of the Tunica Convention and Visitors Bureau.

The Coast Guard in Louisville, Kentucky?



The long, eventful history of U.S. Life-Saving Service Station Number Ten.

by LCDR JERRY NAUERT
USCGR, Port Security Specialist, U.S. Coast Guard Sector Ohio Valley

Mention to someone that you are assigned in Louisville, Ky. with the Coast Guard and the response is generally a long pause ... followed by the question, "What's the Coast Guard doing in Louisville, Kentucky?"

lives in four years. The three heroes again were recognized by Special Act of the Kentucky Legislature in 1880, and were presented medals by Governor Luke Blackburn.²

Ready and Reckless

Believe it or not, the Coast Guard can trace its roots to the Derby City as early as 1881 when U.S. Life-Saving Service (USLSS) Station Number Ten was officially established. The station was about the size of a modest two-story house and was home to a very daring and colorful bunch of volunteer surfmen, who, at all hours of the day and night, would man their surfboats (affectionately named the *Ready* and the *Reckless*) to save a hapless individual from the perils of the cold and muddy water.¹

Even before the official commissioning of the station, these volunteers proved their worth at this treacherous point on the Ohio River with notoriety. In 1874, then Captain John E. Gilooly and two other rescue team members were awarded Congressional Gold Medals for saving 45



The first U.S. Life-Saving Service Station Number Ten, year unknown. Photo courtesy of Mr. Mike Maloney.





U.S. Life-Saving Service Station crewmember Ed Farrell, 1883. Photo courtesy of Mr. Mike Maloney.

A Permanent Station

The general superintendent of the service at that time, Sumner I. Kimball, took notice and recognized the glaring need to place a permanent crew. The number of rescues — and deaths — directly in front of the Louisville waterfront at the Falls of the Ohio (a two-mile stretch of the Ohio River, across which vessels drop 26 feet in elevation) was just too high.

The first few feet of the *Queen City* nosed out over the falls before, miraculously, she struck a rock on the river's bottom and held fast. Unsure how long the vessel would hold her position, the captain blew the whistle for help.

[Coast Guard Surfman William] Drazel, who had spotted the disaster, ran down from the lookout, a half-dozen flights of steps, and joined Captain Gillooly and the other surfmen in launching *Reckless* and *Ready*. Although they had to pull through freezing temperatures and ice floes an inch thick, both skiffs reached the *Queen City* within minutes. Once aboard, Captain Gillooly calmed the excited and confused passengers, attempting to restore order. He realized that the boat could slide over the falls at any second, and ordered his men to worry about people first, and possessions later. Due to the late hour, some heavy sleepers had to be pulled from their beds in various states of undress, and then led in stunned bewilderment to safety. Gillooly also ordered his surfmen to lower and man the steamer's yawl for use in transporting passengers and crew to safety.

During the night, the intense cold and thick mist caused ice to form on the boats and oars. Besides adding weight to the oars themselves, ice on the oar locks

continued on page 80

The crew justified its permanent status by its continued heroic acts well into the next century. As noted in the *Louisville Courier-Journal*:

"On February 10, 1914, the steamer *Queen City* left Pittsburgh, bound for the Mardi Gras celebration in New Orleans, planning to ride the Ohio west to the Mississippi. At 1:30 a.m. on the 17th, the captain of the stern-wheel steamer attempted to dock at a wharf in Louisville, but heavy rain had swelled the river, and the vessel got caught in a current and bypassed the docking facilities. In a nightmare scenario, the steamer, with over 200 people on board, headed for the falls.



The crew of U.S. Life-Saving Service Station Number Ten, 1895. Photo courtesy of Mr. Mike Maloney.



Steamboat History

by LT HERBERT LUMPP

Chief, Response Department, U.S. Coast Guard Marine Safety Unit Huntington

Long before the animated cartoon “Steamboat Willie” made Mickey Mouse famous in 1928, rivers and canals around the world were alive with the sights and sounds of paddle steamers.

A “paddle steamer” is a vessel that is driven by a steam engine and uses one or more paddle wheels to develop thrust for propulsion. Boats with paddle wheels on the sides are termed “sidewheelers,” while those with a wheel on the stern are known as “sternwheelers.” Although generally associated with steam power, paddleboats/paddlewheelers have also used diesel engines, animal power, and human power.

In 1783, Claude-Francois-Dorothee, marquis de Jouffroy d’Abbans, built the first paddle-driven steamship. A vessel of 182 tons displacement, it was called the *Pyroscaphe* and was fitted with a double ratchet mechanism that produced continuous rotation of two paddle wheels. On July 15, 1783, it steamed successfully up the Saône River in eastern France for 15 minutes before the overburdened boat disintegrated from the pounding of the engines. Further development of the *Pyroscaphe* was cut short because of political events.

The next successful attempt at a paddle-driven steamship was by Scottish engineer William Symington. Experimental boats were built in 1788 and 1789 with moderate success. In 1801, Lord Dundas of the Forth and Clyde Canal Company gave Symington support to build a barge-hauler, the *Charlotte Dundas*, named after one of Dundas’ daughters. In 1802, the *Charlotte Dundas* successfully towed two 70-ton barges 19.5 miles to the head of the Forth and Clyde Canal to Glasgow in six hours. The *Charlotte Dundas* is considered to be the first “practical” steamboat because, even though it was never considered a commercial success, it was the first to be followed by the continuous development of steamboats.

Not long after *Charlotte Dundas’* successful voyage, Robert Fulton’s *North River Steamboat* (also known as *Clermont*) set the stage for commercial use of

steamboats. On August 17, 1807, the *North River Steamboat* inaugurated the first successful commercial steamboat service in the world when it began a regular passenger boat service between New York City and Albany, N.Y. Steamboats on major American rivers soon followed Fulton's success.

Due to the simplicity of these vessels and their shallow draft, they successfully penetrated deep into the continent. Steamboats quickly became indispensable to pioneer communities that were otherwise cut off from the outside world. Because of their shallow, flat-bottomed construction (most sternwheelers needed less than three feet of water to float in), they could nose up almost anywhere along a riverbank to pick up or drop off passengers and freight.

Trade on the Mississippi River would be dominated by paddle-wheel steamboats for most of the 19th century and part of the early 20th century. The *Anson Northrup* became the first steamer to cross the U.S.-Canadian border on the Red River in 1859.

Unfortunately, because most steamboats led a hard life, very few have survived to the present day. Most were destroyed by boiler explosions or fires. One of the few surviving sternwheelers from this period, the *Belle of Louisville*, operating out of Louisville, Ky., is the oldest continually operating steamboat on the inland waterways of the United States. Her keel was laid in 1914, and she was originally christened as the *Idlewild*.

About the author:

LT Herbert Lumpp is the Response Department chief, and formerly the logistics officer, at Marine Safety Unit Huntington, located in Barboursville, W.Va. He has more than 18 years of Coast Guard service and has been assigned to a variety of units, including high- and medium-endurance cutters, small boat stations, and groups.

Bibliography:

Encyclopedia Britannica Online, 2007.
The Manitoba Historical Society, <http://www.mhs.mb.ca/docs/transactions/3/redrivercart.shtml>.
<http://belleoflouisville.org/>
http://www.discoverfrance.net/France/Waterways/DF_waterways4.shtml



would have made the oars nearly impossible to move, and ice on the handles would have yielded no firm grip whatsoever. The surfmen spent most of the night breaking the ice off of their equipment in between runs. By 5 a.m., they had rescued all 215 people.”³

The station provided a notable service of value once again during the World War II era by serving as the base of operations for a volunteer group of Coast Guard Reservists who provided security in the Port of Louisville when it was discovered that diagrams of and maps to Lock #49 (now known as the McAlpine Lock and Dam) were found in the possession of German saboteurs who were apprehended on the beaches of New York and Florida before the U.S.’s official entrance in the war.

There have actually been three station structures at this location: the original, its first replacement in 1902, and the third in 1929. In 1915, when the Coast Guard was formed by combining the Life-Saving Service and the Revenue Cutter Service, USLSS Station Number Ten was renamed U.S. Coast Guard Station Number 276.⁴

Personnel continued the work of saving souls from the clutches of the swift current, but, as the role of the Coast Guard evolved over the years, the Coasties assigned to this station took on other roles, such as marine inspection. Over time they became less active in the lead role of search and rescue. In fact, the station was decommissioned in 1972 and turned over to the Jefferson County Kentucky Police River Patrol.⁵

Decommissioned but Not Forgotten

Though decommissioned, the Coast Guard never fully gave up its attachment to the USLSS. In 1990, Coast Guard volunteers provided significant assistance to renovate the station before it was placed on the National Historic Landmark list. And in June of 2005, the

Coast Guard’s presence in Louisville grew substantially when Marine Safety Office Louisville and Group Ohio Valley combined to create Sector Ohio Valley, taking under its umbrella Marine Safety Units Pittsburgh, Huntington, Paducah; Marine Safety Detachment Nashville and Cincinnati; six Coast Guard river tenders; five shore side detachments; and one Loran station. Overall, parts of ten states and 3,500 miles of navigable waterways are now within the sector’s area of responsibility.

The sector’s first commander, CAPT John Bingaman, felt the heritage of the USLSS station needed to be kept alive. Therefore, he approved its image to be placed prominently in the new unit emblem.

Today the USLSS station houses the offices of the historic steam vessel *Belle of Louisville*, the oldest of her kind in the nation. When the *Belle* celebrates her 100th birthday in 2014, the USLSS station (and the Coast Guard) will play an important role in the celebration festivities along the Louisville waterfront. Plans are underway for more renovations, and one might even see a USLSS-uniformed surfman walking about, ready to tell stories of the heroic deeds of his compatriots from more than a century past.

About the author:

LCDR Gerald (Jerry) Nauert has been a member of the Coast Guard Reserve for 18 years. He retired as a captain with the Kentucky State Police after 25 years, is a native of Louisville, and is now employed by the Coast Guard in a civilian capacity as a port security specialist at Sector Ohio Valley.

Endnotes:

- ¹ Dennis L. Noble, Gulf Coast and Western Rivers; “A brief history of U. S. Coast Guard operations,” Commandant’s Bulletin, Bicentennial Series, 1990.
- ² Falls City Engineer, January /February 1991.
- ³ Louisville Courier-Journal, May 1921.
- ⁴ Robert Erwin Johnson, “Guardians of the Sea: History of the United States Coast Guard,” Annapolis, Md., Naval Institute Press, 1987.
- ⁵ Coast Guard Historian’s Office, “Louisville Station,” notes and correspondence file concerning the disestablishment of the station, U.S. Coast Guard Headquarters, Washington, D.C.





A Day in the Life of a Lead Deckhand

by CAPTAIN RICHARD L. EHRINGER

Consul Energy, General Manager of Mon River Towing

I start my day at the sound of the alarm clock at 4:30 a.m., one hour before the start of the watch. This gives me time to grab a cup of coffee and a quick breakfast. I also take the fuel report at this time so I am not in a rush or interrupted. At 5:30 a.m. I relieve the leadman on the back watch.

If we are in a landing at this time, my stern deckhand and I will finish any remaining work. After tow is completed, I'll check every barge for water or leakers. I then place the pumps where needed. Then I return back to the pilot house to check the orders and attend a safety meeting.

At this point it is daylight and I am able to go out to shovel and sweep the barges. While sweeping, I'll check the safety lines and clean up any busted lines or wires. After this, I usually head back to the boat for a short break.

After my break, I'll report to the captain to see if there are any specific tasks that he would like me to do. These tasks usually consist of painting or specific cleaning jobs. After I have completed the above tasks I will check the engines and light plants in the engine room. This check is the responsibility of the lead deckhand.

Between 9:30 a.m. and 10:00 a.m., I will start to prepare lunch for my watch and the next watch. At 11:30 a.m., my watch is completed. These next six hours are my time to shower, eat, call home, relax, and wind down. This is also where I get to sleep. I usually tend to get about 3 to 4 hours of sleep.

Around 4:30 p.m. I will wake up and start all over again. I'll grab a cup of coffee, a quick bite, and relax until 5:30 p.m., when it's time to relieve the previous watch. I start by checking the barges for water and move pumps if needed. I then report back to the pilot house for another safety meeting. After the meeting I find out what tasks the captain has for me. I'll then head to the engine room to check the engines, drain any water, and clean up any oil on the floor.

At this point, I will take a break and get a snack or cold drink. After my break, I will start on any tasks that the captain has given to me. After this, I will spend some time on some odds and ends. These consist of putting eyes in lines, checking batteries for water, wiping down walls, and checking the light bulbs around the boat. Some other tasks also include sweeping the gunnels, picking up trash off the decks, and anything else I see that needs to be done.

All of these tasks are completed in between building a tow and guiding the pilot through the locks. Every watch is different, depending on the orders and any situations that could occur. Finally, at 11:30 p.m., my watch is over.

And so it goes, pretty much the same, day after day for 14 days. As the forward lead deckhand, I work from 6:00 a.m. until noon, and again from 6:00 p.m. until midnight, a total of 12 hours per day.

A lead deckhand's days vary from one task to another, depending on what our delivery and pick-up orders are. One watch, I may be just riding out the watch between landings. That's when I catch up on cleaning, chipping, painting, or whatever else needs to be done on the boat. The captain will always find something that should be done. Maintenance and cleaning on the boat is an ongoing process. Other watches, I'll find myself in a landing, wiring a tow together for the entire watch. Not too often, but it happens.

My hitch will be over in a couple more days and then I'll be home for seven days (actually six full days). At home I'll have to readjust my sleep patterns again. That will take a day or two with the absence of the engine noises that I got accustomed to for 14 days.

I'm sure there will be things around the house to catch up on, and I want to get started on them as soon as I'm off, so I'll have a few days to relax before I go back on the boat. My wife told me a couple days ago that she caught the washer regurgitating and dancing across the basement. She'll have that first on my to-do list.

All in all it's a pretty good life once you adapt. The pay and benefits are decent. I'm saving some for retirement and my co-workers are all pretty good guys. There's a lot worse ways to make a living.

About the author:

Captain Ehringer started with J&L Steel Corporation as a deckhand in March of 1963 and soon earned his first mate, master, and first class pilot licenses for inland river steam and motor vessels (all gross tonnage). Since 1983, he has managed various aspects of customer service and operations for the Mon Valley Transportation Division, Ingram Barge Company, and Mon River Towing, where he now serves as general manager. He has also held several leadership positions for the Waterways Association of Pittsburgh, the Port of Pittsburgh Commission, and both the Pittsburgh Maritime and Propeller Clubs.



PROCEEDINGS Magazine
READER'S SURVEY

What You're Saying



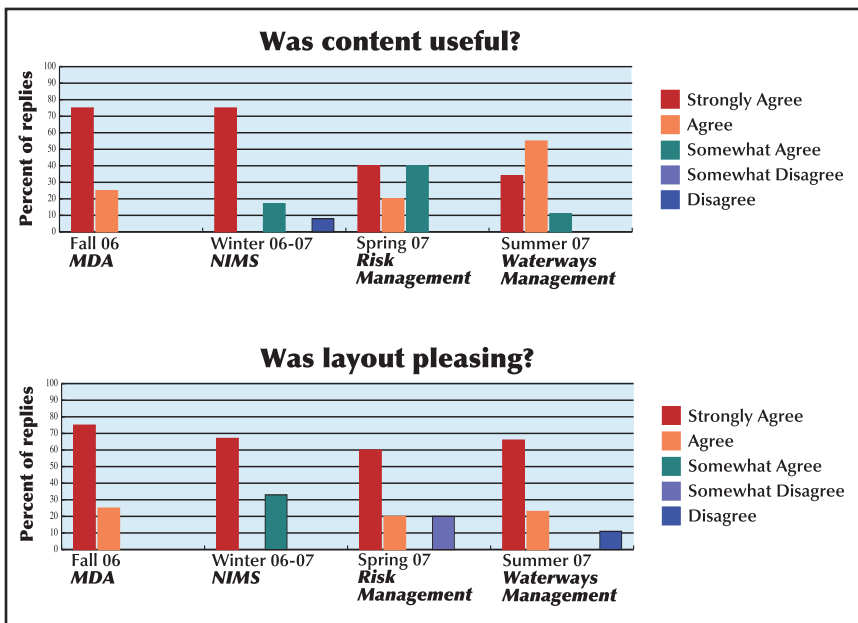
How about a regular column on casualty investigations and prevention? Single-topic issues are really boring! Winter 2006-07

Articles that highlight the CG ability to forge successful partnerships are very welcome. It really shows what can be done well with a government agency that has a KNACK for getting such a broad range of missions and then must rely upon more than just dollars to accomplish them. I work in an off-dock cargo handling facility. Some focus with an article or two that's relevant to this portion of the industry under the main subject of an issue might be helpful. Winter 06-07

The last two issues of Proceedings have read like procedural manuals for the command staff of the Coast Guard. The amount of technical information presented in recent issues was overwhelming. Although well written, it may have been a little too much for your average reader, unless most of your readers are in the admiralty. Winter 06-07

Enjoyed this issue as casualty investigations provide hard-to-learn real-world situations concerning seamen, ships, equipment & rules. Would like more (many more) casualty reports, causes and conclusions and more interesting reading to your non-Coast Guard (and retired USCG) readers. Summer 2006

Keep hammering away on intel and fusion. A little case study on a positive operational result from actionable intel would be great. (Fall 2006) was way too much data all at once. Every article should be required reading for every commanding officer and those who aspire to command, but it took me two days of concerted on-and-off reading to get through it. Help us get through it in bite-sized chunks or perhaps disseminate the Cliff Notes version via CG Central or Homeport. This sheer volume of reading at the field level is overwhelming and will most likely go unread at the field level. Fall 2006



Security and safety are both serious subjects. To catch the readers' attention it might be worth considering including a humorous anecdote connected with the above topics. Spring 2007

Great content and very timely themes lately. Nice work! Magazine appears to be on a real upswing and a giant leap forward in professionalism and look. Real meaty content being provided by a well-rounded collection of authors and subject matter experts—not just a bunch of Coasties giving sermons. I also like the opportunity to provide and see feedback now in the magazine. Keep up the great work. BZ! Summer 2007

I would like to read about real-life action or incidents regarding security, criminal activities, violations of rules & regulations, etc. and the investigations, disposition, or end results of these kinds of matters. In any case, the magazine is still of great interest to me. Spring 2006

You do an excellent job of covering a broad range of applicable topics. Carry on! The engineering and nautical questions at the end of each issue are good, and a good challenge. Please don't show the answers on the same page, though! Much better to have the answers a few pages away. Summer 2007

First - thanks for a great job. Might suggest: Realizing CG tasks within Homeland Sec - seems to have pushed aside traditional USCG topics ... and in that vein ... how about "Collision" series, bearing down on what went wrong, why and what might have been done differently given the applicable ColRegs? In your Deck and Engineering Queries sections, it's VERY distracting to have the correct answer highlighted before a chance to read (and make decisions as to) all the options. Suggest inverted answer key at bottom as you used to have. Having the answer staring you in the face before making the decision destroys any "educational" value. Thanks. Summer 2007

Tell us what you think.
 Survey available online: www.uscg.mil/proceedings



Reader's Survey



What We're Doing

"I would like to read about real-life incidents..."
"How about a regular column on casualty investigations?"
"Would like more (many more) casualty reports..."

We have added a regular "Lessons Learned" section in *Proceedings*, where we will delve into marine casualties.

We will explore how each incident occurred, outline the U.S. Coast Guard marine casualty investigation that followed, describe the lessons learned through the investigation of these incidents, and document any changes in maritime regulations that occurred as a result.

"Would like to see a little more on seamanship and seaworthiness and maybe a little less on homeland security and law enforcement."

"Single-topic issues are really boring!"

Look for special sections in upcoming editions, where we will explore varied topics in addition to the main issue topic.

We will also continue to include "Mariner's Seabag" features and "Prevention Through People" articles in future issues.

Most importantly: We're listening!

*We appreciate hearing your opinions and ideas.
Keep them coming!*

Go to www.uscg.mil/proceedings click on "Reader's Survey," and tell us what you think.

PROCEEDINGS Magazine READER'S SURVEY

"...way too much data all at once. Help us get through it in bite-sized chunks. The sheer volume of reading...is overwhelming..."

"The amount of technical information presented in recent issues was overwhelming. Although well written, it may have been a little too much for your average reader, unless most of your readers are in the admiralty."

We hear you—and agree!

We have added sidebars that contain "must-read" information to most of *Proceedings'* articles. Look for text with special graphic treatment, set off from the main text of an article.

We have also added more charts, tables, and graphics to illustrate and emphasize important information.

"The engineering and nautical questions at the end of each issue are good. Please don't show the answers on the same page, though!"

"In your Deck and Engineering Queries sections, it's VERY distracting to have the correct answer highlighted before a chance to read (and make decisions as to) all the options."

Once again, we're on the same wavelength.

We had come to that same conclusion and implemented a redesign of the Nautical Queries section for the Fall 2007 issue, just as these comments from the Summer 2007 survey were coming in. **Take a look at the new Nautical Queries** and let us know what you think.

We're pleased that you read *Proceedings* with such careful attention, and we're always happy to hear of ways to make *Proceedings* more interactive.



Reader's Survey

Lessons Learned

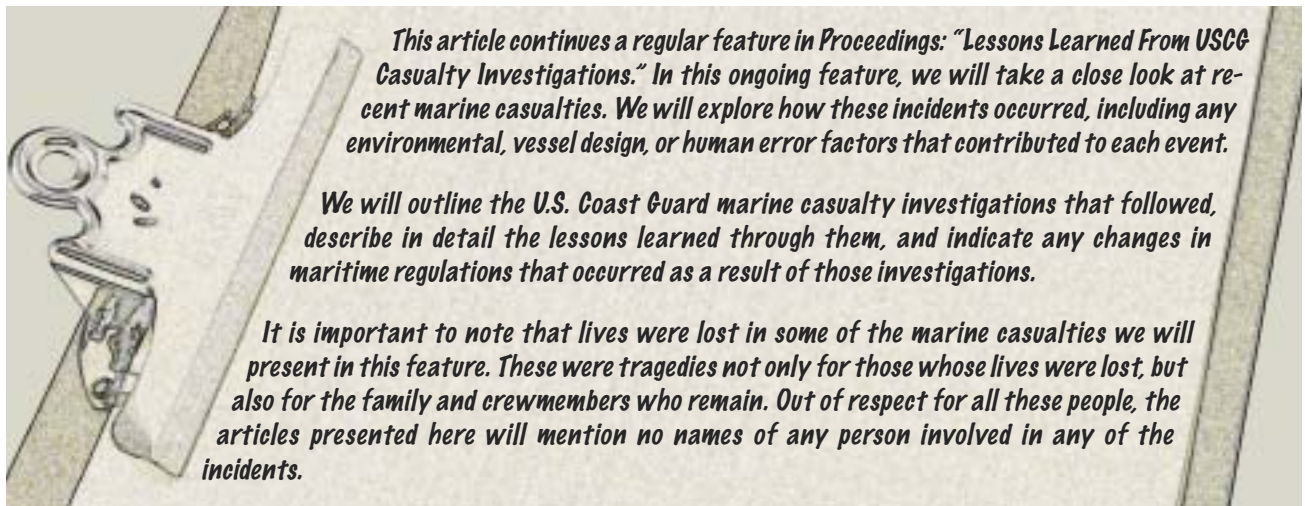


from Casualty Investigations

Dangerous Assumptions

Three vessels collide.

by Ms. BARBARA CHIARIZIA
Executive Editor, Proceedings



August 10, 1993 dawned clear and very warm in Tampa, Fla. Visibility was good, even in the predawn darkness, with no fog or haze. The wind clocked in at around 15 knots. All aids to navigation in the Tampa Bay area were on station and watching properly. Sea and tide conditions were normal. So why did three vessels, piloted by seasoned mariners who were familiar with Tampa Bay, meet in collisions that caused a catastrophic oil spill and fire?

The vessels in question, the M/V *Balsa 37*, a 4,337-gross-ton freighter; the integrated tug barge *Seafarer*; and the tug *Capt. Fred Bouchard* were transiting Tampa Bay on routine voyages. The *Balsa 37* was outbound, carrying 6,000 metric tons of phosphate en route to Columbia. The other vessels were inbound. *Seafarer* was made up to the tank barge *Ocean 255*, which was carrying 236,000 barrels of petroleum products, including gasoline and

jet fuel. The *Bouchard* was pushing the petroleum-laden barge *B. No. 155*.

Egmont Channel and Mullet Key Channel

Just before dawn on that August day, the vessels approached the confluence of Egmont Channel and Mullet Key Channel in Tampa Bay. An assist tug, the *Edna St. Phillip*, was made up to the *B. No. 155*, as the *Bouchard* had suffered a starboard engine casualty. This configuration was unremarkable and caused no undue navigational hazard, but the tow was only making six knots.

The other inbound tow was approximately one-half mile astern in Egmont Channel as they both approached the turn into Mullet Key Channel. The outbound vessel was at that time transiting Mullet Key Channel.

The USCG Marine Board of Investigation report noted that all conferred regarding meeting arrangements. It is

This article is based on the final U.S. Coast Guard Marine Board of Investigation report of the incident. All conclusions are based on information taken from this report.

reported that the pilot of the lead inbound tow radioed to the outbound vessel, proposing a port-to-port meeting. This request was echoed by the captain of the trailing inbound tow. It was agreed that all would pass port to port.

Faulty Assumptions

There were many factors that led to the subsequent marine casualty. As noted in the USCG report, the various mariners made assumptions regarding the intentions of the other vessels. For example, the pilot of the outbound vessel assumed that he would meet the *Bouchard* first, as it was the lead inbound vessel when the meeting arrangements were made. Those aboard the inbound tows assumed that the outbound freighter would steer a course that would keep it well to the north side of the waterway at the turn into Egmont Channel.

Neither of these (or several other) assumptions was correct, and the outbound freighter collided with the inbound *Seafarer* tow near mid-channel, as that vessel was overtaking the slower inbound *Bouchard*. The outbound vessel then collided with the *Bouchard* tow.

The results were catastrophic. In the aftermath of these collisions, more than 5,000 barrels of oil spilled from the *B. No. 155*, and *Ocean 255's* no. 1 starboard tank ruptured, its cargo set alight by the sparks from the collision. Subsequently, the *Ocean 255's* no. 6 starboard tank, which was loaded with more than 16,000 barrels of jet fuel, exploded.

This incident closed the main ship channel for the Port of Tampa for two days and caused significant environmental damage. Following this incident, the U.S. Coast Guard convened a Marine Board of Investigation to determine how it occurred. The USCG investigation focused on many elements, including:

- the tide and weather conditions,
- the channel,
- the aids to navigation,
- the vessels,
- the personnel.

To best understand the interactions that led to this calamity, it may help to review the voyage of each vessel separately.

The *Seafarer*

The tow—consisting of the integrated tug barge *Seafarer* and the 546-foot tank barge *Ocean 255*—departed Pascagoula, Miss., on August 8, bound for Tampa with its cargo of gasoline and jet fuel. As the tow passed the

sea buoy at approximately 4 a.m. on August 10, the mate called Tampa Bay vessel traffic advisory¹ to report his sea buoy time. He also gave the estimated time of arrival at Sunshine Skyway Bridge (6:10 a.m.) and at the final destination, GATX terminal in Tampa, Fla. (9:30 a.m.).

During the approach, the tow met an outbound tanker port to port and agreed to be overtaken by another inbound vessel. The mate observed the *Bouchard* tow entering the channel inbound from the north. He also overheard radio conversations in which the master of the *Bouchard* noted that his starboard main engine was shut down and he intended to take an assist tug alongside. The mate also determined from radio calls that the *Balsa 37* was outbound.

When his tow was approximately 1.5 miles astern of the *Bouchard*, the mate slowed to allow the other inbound vessel to overtake. At that time, he declined an offer to overtake the slower *Bouchard*. As stated in the USCG report:

“Captain ... arrived in the lower pilothouse to relieve mate ... of the watch as the *Seafarer* tow was being overtaken by [the other inbound vessel] approximately three-quarters of a mile from buoys 15 and 16.

Mate ... briefed the captain on the traffic situation. In a radio conversation with pilot [of the *Bouchard* tow], mate ... declined a second offer to overtake.”²

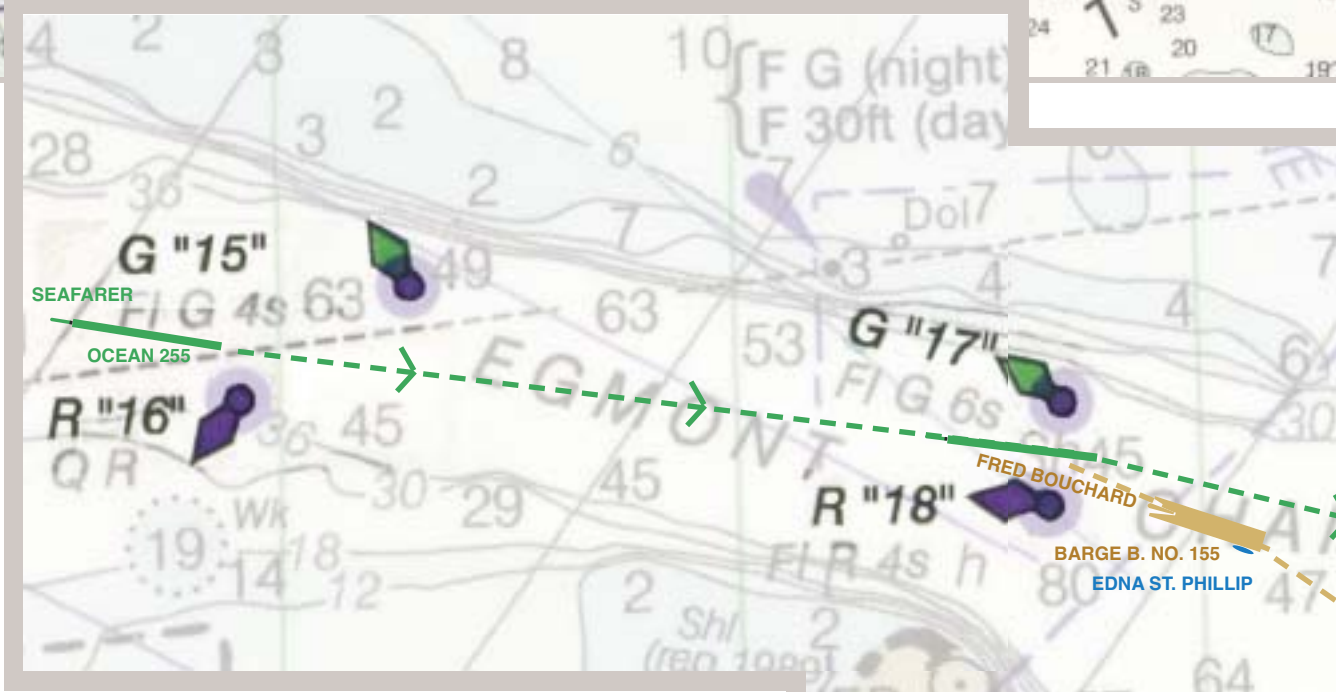
It can be inferred from the report that the mate assumed the captain overheard him decline the offer to overtake the slower inbound vessel. The report continued:

“At approximately 5:39 a.m. captain ... assumed the watch. Captain ... told mate ... to go below for breakfast and return. At captain’s ... command, mate ... advanced the throttles to full ahead as he left the pilothouse. Captain ... steered the ... tow toward the center of the channel to pass the *Bouchard* tow.”³

At this point, the report mentioned a lot of radio chatter. As he moved to overtake, the captain of the *Seafarer* overheard a conversation between the other two pilots, arranging a port-to-port meeting. The captain then radioed the pilot of the slower inbound vessel and requested permission to overtake. The *Bouchard* pilot consented to the overtaking, if the outbound *Balsa* agreed.

“Without unkeying the radio, captain ... called pilot [of the *Balsa 37*], who replied that a port-to-port meeting was agreeable. Captain ... did not communicate ... that





The collision: According to the report, the inbound *Bouchard* tow was approaching buoys 19 and 20 when the *Seafarer* tow started to overtake. At the same time, the outbound freighter *M/V Balsa 37* was steering a course that would bring it near the center of the channel at the turn into Egmont Channel. The *Seafarer* tow collided with the outbound *Balsa* before completing its overtaking of the *Bouchard* tow. The *Balsa* then collided with the *Bouchard* tow. *Note: Vessels are not depicted to scale.

the ... tow was in the process of overtaking the *Bouchard* tow.”⁴

The USCG report continued:

“Mate ... was below for approximately four minutes. When he returned ... he could see the bow of the *B. No. 155* to starboard and slightly astern. He observed that the two tows were not parallel ... Captain ... was watching the approaching [vessel]. He intended to fall back in front of the *Bouchard* tow as he completed his turn into Mullet Key Channel.

Both men watched the *Balsa 37*, anticipating its turn at any time. Captain ... was expecting the [freighter] to make a hard turn into Egmont Channel. Mate ... checked the radar. It was apparent that the [freighter]

has passed the point where it had to make its turn. While captain ... was reaching for his radio, pilot [of the *Balsa 37*] urgently called as to *Seafarer's* intentions. Captain ... replied that they had agreed on a port-to-port meeting. By now [they] were beyond the point of ‘in extremis.’ Pilot ... replied that they would have to make it a starboard-to-starboard meeting. Captain ... replied he would come to port.”⁵

Although the mariners attempted to avoid a collision, they were unsuccessful. The resulting collision caused massive damage to both vessels, and *Ocean 255's* no. 1 starboard tank ruptured and its cargo caught fire.

The Capt. Fred Bouchard

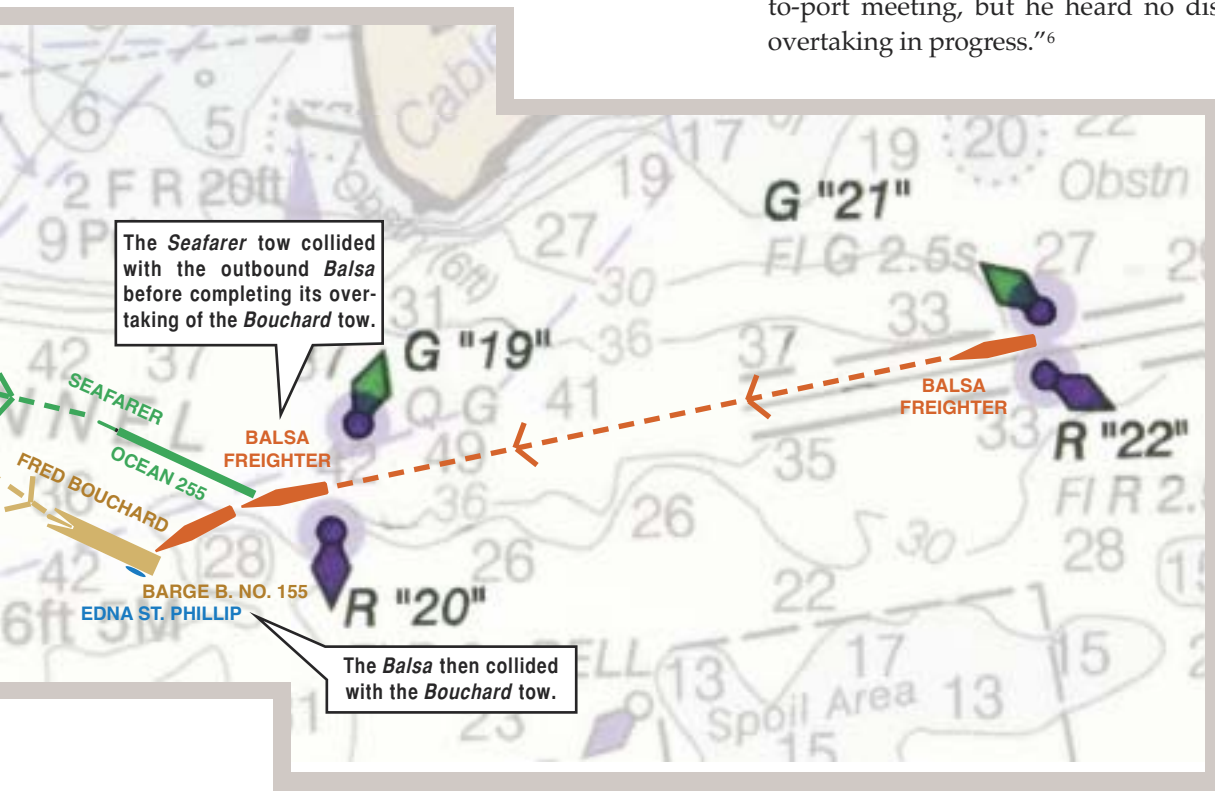
The tug, made up with the tank barge *B No. 155*, which was loaded with 120,000 barrels of no. 6 oil, departed Good Hope, La., on August 7, bound for Port Manatee, Fla. At approximately 4:15 p.m. on August 9, the tug experienced problems with its starboard main engine and the engineer shut it down.



KEY: *Note: Vessels are not depicted to scale.

- SEAFARER
- OCEAN 255
- FRED BOUCHARD
- BARGE B. NO. 155
- EDNA ST. PHILLIP
- BALSA FREIGHTER

bound freighter] *Balsa 37* and arranged a port-to-port meeting. At approximately 5:40 a.m., with the bow of the *B. No. 155* approximately eight-tenths of a mile from buoys 19 and 20, captain ... felt the interaction of the *Ocean 255*, which was starting to overtake. Captain [of the trailing tow] then called, indicating his position off the tow's port quarter and his desire to overtake. Pilot ... consented to the overtaking as long as it was agreeable with [oncoming freighter's] pilot. [*Bouchard's*] pilot heard [*Seafarer's*] captain call [the pilot of the outbound freighter] immediately and arrange for a port-to-port meeting, but he heard no discussion of the overtaking in progress."⁶



As the scene unfolded, the mariners aboard the *Bouchard* tow reported that they overheard the urgent radio conversation between the mariners on the other vessels as they tried to avoid collision.

The captain arranged for the assistance of the tug *Edna St. Phillip* for the remainder of the voyage to Port Manatee. The tug was made up to the starboard bow of the tank barge as the tow transited Tampa Bay.

The captain was at the helm and the pilot managed the radio. After hearing a pilot on another vessel make arrangements to overtake the *Seafarer*, which, at this point was astern of his vessel, *Bouchard's* pilot also made arrangements to be overtaken. He then called the *Seafarer*, and stated that the vessel could overtake him as well. *Seafarer's* mate declined due to the heavy outbound traffic ahead.

The USCG report set the scene:

"Just after the tow passed abeam of Egmont Key Light-house, [*Bouchard's*] pilot ... called pilot ... on the [out-

The report continued:

"Captain ... and pilot [of the *Bouchard* tow] could see the red sidelight and the range lights of the *Balsa 37*. Pilot ... observed the tug *Seafarer* shudder. Both ... then saw the range lights of the [outbound freighter] close, then open, as the ship turned to port. Its red sidelight disappeared and its green sidelight came into view.

Seconds later, the [two vessels] collided. [*Bouchard's*] captain immediately sounded the danger signal and general alarm and backed the port engine full.

Struck first on its starboard bow, the [freighter] yawed first to port, then abruptly to starboard as the bow of the *Ocean 255* moved along its side. The two vessels separated, and, seconds later, the bow of the *Balsa 37*



impacted the port side of the *B. No. 155* in way of its No. 1 port cargo tank.”⁷

The *Balsa 37*

The freighter departed Port Manatee, Fla. on August 10, at 4:45 a.m., outbound for Columbia. All machinery and systems were checked and working properly. As noted in the USCG report:

“[The] pilot, captain, and third mate were on the bridge as the vessel got underway. The third mate was positioned at the engine order telegraph. [The freighter] passed under the Sunshine Skyway Bridge at 5:24 a.m. at its sea speed of 11 knots. [The captain] secured the anchor watch and ordered the chief mate to prepare the vessel for sea. [The pilot] advised the captain that a bow look-out was not needed, because the visibility was good.”⁸

Shortly thereafter, an inbound vessel placed the outbound freighter to the north side of Mullet Key Channel, passing within 100 feet of buoy 21. The report continued:

“Passing abeam buoy 21, the [vessel] continued on its previous course of 261° T. However, pilot ... believed he had ordered a change to 262° T, which would bring the ship closer to buoy 19 at the turn.”⁹

When the vessel was in the vicinity of buoy 21, the pilot noted on the radar an inbound vessel, with another following astern, near buoy 18 in Egmont Channel. He was also able to see the red sidelights of these vessels. Just after passing buoy 21, the pilot received a radio call from the pilot of the lead inbound vessel, proposing a port-to-port meeting. A minute later, the captain of the trailing vessel radioed, also proposing a port-to-port meeting. The *Balsa 37* pilot agreed to each meeting.

At that time, the outbound pilot made a radio call to the pilot boat operator to arrange for his pick-up and transfer to his next assignment. He did not hear a radio conversation in which the captain of the trailing tow informed the *Bouchard* tow’s captain that he was overtaking.

“At approximately 5:45 a.m.,” the report continued, “pilot [of the *Balsa 37*] observed a green sidelight crossing his bow. The bows ... were about 1,000 to 1,400 feet apart and closing at a relative rate of approximately 19 knots. Pilot ... immediately called on Channel 13 to determine the intentions of the *Seafarer* tow. Captain ... replied that they had agreed to a port-to-port meeting. Pilot urgently replied that it needed to be starboard-to-

starboard. Captain ... radioed that he would attempt to turn to port.

Pilot ... first ordered the ... rudder left 10 degrees, followed by 20 degrees. He directed the chief mate to call the captain, and ordered the rudder hard to port and the engines full astern. The helmsman executed the helm commands but the chief mate did not pass the engine orders because he had exited the bridge to alert [the] captain.

At approximately 5:45 a.m., the starboard bow of the *Ocean 255* struck the starboard side of the *Balsa 37* at the break of the forecastle ... flames erupted ... as the *Ocean 255* raked the starboard side of [the outbound freighter]. The collision caused extensive damage to the freighter’s hull and superstructure.

As [that] tow moved away, pilot ... observed that the freighter was headed toward collision with the *Bouchard* tow. In an attempt to make a port-to-port passing, pilot ... ordered the helm hard to starboard, but there was too little time to regain control.

Less than one minute after striking the *Ocean 255*, the bow of the *Balsa 37* impacted the port bow of the *B. No. 155*.”¹⁰

The Aftermath

As a result of these collisions, the *Ocean 255* was in flames. The *B. No. 155*’s port tank was ruptured and spilled its cargo of no. 6 oil into the waterway. *Balsa 37* suffered damage to both cargo holds. Fortunately, there were no fatalities or serious injuries as a result of this incident.

In the aftermath, there was plenty of blame to go around, and the USCG Marine Board of Investigation report apportioned blame among all the mariners involved. The captain of the *Seafarer* tow received the lion’s share, due to his ill-advised attempt to overtake another tow near a turn, with approaching outbound traffic. As a result of this incident, *Seafarer*’s captain received a six-month suspension of his mariner’s license.

The pilot of the other inbound tow was cited for assenting to being overtaken and the pilot and captain were blamed for not alerting the outbound vessel of the overtaking when the captain of the overtaking vessel failed to do so.

The report also noted that the pilot of the outbound freighter was inattentive to his duties, as he failed to

continued on page 90

After the Collisions

Aboard the *Seafarer*

After the collision with the outbound freighter, the captain tried to disconnect the *Seafarer* from the flaming tank barge, but was unable. As heavy, black smoke surrounded the pilothouse, he placed the throttles ahead slow, rudder position hard left, to ground the tow on the sandy bottom near Mullet Key. He then left the pilothouse to muster personnel.

As noted in the Marine Board of Investigation report:

"Captain ... and mate ... decided to try one more time to get out of the notch. As they reached the last flight of stairs leading to the lower wheelhouse, captain ... could see the wheelhouse lit up from fire and could hear windows exploding and glass hitting the deck. The two men abandoned their attempt to enter the pilothouse and returned to the galley.

By now, the smoke had increased to the point that personnel at deck level were having difficulty seeing and breathing. The life raft was inaccessible because of its location on the upper deck. Captain ... ordered the crew to abandon ship...

When the crew entered the water, they found that there was less smoke near the surface and breathing was easier. They could see smoke and flames above them. Captain ... heard a rumbling sound from the *Ocean 255* and two or three explosions. Approximately 12 to 14 minutes after the collision, captain ... heard one loud explosion, which was preceded by a loud 'hissing' sound (this was assumed to be the explosion that blew the top off of the no. 6 starboard cargo tank).

The crew was later rescued by the pilot boat *Manatee*. The *Ocean 255* grounded approximately 600 yards south/southwest of the Fort De Soto pier on Mullet Key. The fire burned throughout the day until extinguished later that night by the Tampa Fire Department. The *Seafarer* suffered extensive fire damage, and the *Ocean 255* was a constructive total loss."¹

On the Bridge of the *Balsa 37*

This vessel was involved in both collisions and suffered much damage. The main concern was that the vessel would

capsize or sink and block the channel. As stated in the USCG report:

"Captain ... arrived on the bridge and ordered all hands to muster for the emergency and had pilot ... take the ship to anchorage near Egmont Key. He then confirmed with pilot ... that a distress call had been sent.



As the *Balsa 37* proceeded toward anchorage, the chief mate opened the cargo hatches and observed sea water in both cargo holds. Sounding also revealed water in the forepeak tank. Concerned for the vessel's stability, captain ... grounded the [vessel] near Egmont Key.

The ship remained aground for several days until lightering and salvage operations could be completed."²

On the *Capt. Fred Bouchard*

The USCG report set the scene:

"Pilot ... immediately made a distress call on Channel 16. Pilot ... advised captain ... to make a course correction to keep the tow in the channel. He then called the pilot boat *Manatee* and directed [it] toward the scene to pick up any survivors [from the *Seafarer*].

Following the two collisions, the *Edna St. Phillip* initially let out 60 meters of line to move away from possible hazards. After determining it was safe, the master had his crew again make the tug fast alongside the *B. No. 155*, where it remained until being released at 10:20 a.m. Due to its protected location on the starboard side of the *B. No. 155*, [it] was not damaged in the collisions.

The *Bouchard* tow later anchored approximately one and one-half miles west of the Sunshine Skyway Bridge. The *B. No. 155* was later offloaded and taken to dry dock ... for damage survey and repairs."³

Endnotes:

¹ "United States Coast Guard Investigation into the Circumstances Surrounding the Collision Between the M/V *Balsa 37*, the Tug *Seafarer*, and the tug *Capt. Fred Bouchard* and T/B *No. 155* on August 10, 1993, with no Loss of Life," by J.W. Calhoun, Captain, U.S. Coast Guard; R.E. Bennis, Commander, U.S. Coast Guard; W.H. Daughdrill, Lt. Commander, U.S. Coast Guard; p. 12.

² *Ibid*, p. 10.

³ *Ibid*, p. 14.

ensure that the vessel kept well to his side of the channel, and did not recognize that the *Seafarer* was overtaking. As stated in the report:

“The apparent cause to this casualty was the failure of the pilots and operators of all three of the involved vessels to adequately communicate their intentions and actions, or failure to query as to the intentions and actions of other vessels, in that it was apparent they would meet at or near the turn at buoys 19 and 20.”¹¹

“It appears that complacency may have been a factor. It may have been the attitude of the mariners that all would be well and to hope for the best. Each knew the other vessel was in the hands of a mariner who was familiar with the waterway and had made many transits. There was no weather or other factor that would raise concerns. Simply, the standard of care and level of awareness was not what it should have been.”¹²

Lessons Learned

Although there were many factors that led to this casualty, the lessons learned from it can be summed up in two phrases:

- Don't assume.
- Pay attention.

In this incident, the assumptions ran rampant. The inbound vessels assumed that the outbound freighter would steer a course close that would keep it well to the north side of the channel at the turn into Egmont Channel. Indeed, the pilot of the vessel thought he had ordered that course change. He did not, however, ensure that his order was understood or carried out, and no one aboard the two oncoming vessels questioned the pilot on the delay in initiating the turn.

Many assumptions were made on the basis of radio communications. The USCG report mentions that the various operators made navigational decisions based on what they overheard in radio transmissions. For example, the pilot of the *Bouchard* tow overheard a pilot make arrangements to overtake the *Seafarer*. Since his tow was ahead of them both and only making 6 knots, the *Bouchard* pilot radioed that vessel and also made arrangements to be overtaken. He then made the same offer to the mate on the *Seafarer*, who declined.

The mate probably assumed that the captain had overheard him decline the offer to pass or thought he had mentioned it when he briefed the captain on the traffic situation. He did not ensure that he successfully communicated this. It can also be inferred that the captain

of the *Seafarer* assumed that the pilot of the outbound freighter overheard the radio conversation in which he requested permission to overtake the *Bouchard* tow.

This is where the next admonition—pay attention—comes into play. When the *Seafarer's* captain and the pilot of the *Bouchard* were discussing the overtaking, both mariners probably assumed that the *Balsa* pilot had overheard this conversation. The freighter pilot, however, was at that time making arrangements to be picked up for his next assignment. He wasn't paying attention to the oncoming traffic or (apparently) to the course of his vessel.

Additionally, had the *Seafarer* captain paid attention to his mate's explanation of the traffic situation, or had checked the radar himself, he probably would not have attempted to pass.

Contributing Factors?

During the examination of this casualty, the Marine Board of Investigation report also brought to light some worrisome facts:

- One mariner had two arrests on his record.
- One mariner had a DUI.
- One mariner had four DUIs, two refusals for alcohol testing (driving), two arrests, three federal mariner license suspensions, three federal civil penalties for negligent operation of a vessel, and two state pilot license suspensions.
- One mariner's chief mate license had expired more than a year prior.

The mariner who had allowed his license to expire was fined \$1,000 for this lapse. No other action was taken against him.

As a result of these and other incidents, the Coast Guard has taken action on two fronts. The USCG mariner license application and renewal process has changed since this casualty, and the Coast Guard is working with local stakeholders to establish a cooperative vessel traffic service in Tampa Bay.

A Sea Change

In 1996, the Coast Guard amended the Code of Federal Regulations to include a National Driver Register check and criminal record review for all who apply for a mariner credential (original, renewal, or upgrade). During the application process, for example, a person may be denied a merchant mariner's credential if he or she has been convicted of a drug offense.¹³ Also, according to current statutes:

“An applicant’s criminal record may be used to determine that an applicant’s character and habits of life are such that the applicant cannot be entrusted with the duties and responsibilities of the license or certificate of registry.”¹⁴

Licensed mariners may lose their credentials if certain acts or offenses are proven, including:

- crimes against persons,
- crimes against property,
- vehicular crimes,
- crimes against public safety,
- crimes against national security,
- criminal violations of environmental laws.¹⁵

There are also some offenses for which revocation of a mariner’s credential is mandatory, such as any conviction for the use or sale of dangerous drugs.¹⁶

One must keep in mind, however, that the U.S. Coast Guard only has authority over federal merchant mariner credentials. Various states also issue state pilotage licenses, over which the Coast Guard has no authority or oversight.

CVTS Tampa Bay

Cooperative Vessel Traffic Service (CVTS) Tampa Bay began preliminary operations on December 15, 2006, and is a partnership between the Coast Guard and the Tampa Port Authority. It is staffed (24 hours a day, seven days a week, year-round) by six Coast Guard civilian watchstanders and six Tampa Port Authority watchstanders.

CVTS Tampa Bay will help reduce the risk of incidents such as the one profiled here by monitoring the waterway, providing information and recommendations to mariners, and, when necessary, issuing directions and enforcing navigation safety regulations. All VTS guidance follows this pattern (monitor, inform, recommend, direct) and moves along this continuum to the appropriate intervention level.¹⁷

In a situation similar to the incident profiled here, for example, as watchstanders monitored radio transmissions and AIS and other data, they may have intervened when they felt that the mariners required more information or guidance. VTS watchstanders develop a “sixth sense” about the waterway they monitor and

when something about the traffic situation looks amiss, they can step in to assist the mariners.

In this event, it is likely that the VTS watchstanders would have helped to ensure that each vessel was aware of the intentions of the others, and may have recommended that the vessels closely examine their meeting/overtaking arrangements. Only rarely does VTS intervention move to the most active phase (issuing direction), since most incidents are corrected at the earlier stages.

Of course it is not possible to place a VTS in every port in America. CVTS Tampa Bay, for example, is one of 12 vessel traffic services operated by the U.S. Coast Guard and one of two cooperative vessel traffic services (the other is Los Angeles-Long Beach). Nor does the presence of a vessel traffic service absolve a mariner of responsibility for his vessel. It is incumbent upon all mariners at all times to ensure the safe operation of their vessels.

Fortunately, incidents such as the one described here are rare. This incident, however, serves as a reminder that mariners must remain ever vigilant, since even small errors or lapses in attention can have huge consequences.

About the author:

Ms. Barbara Chiarizia is the executive editor of Proceedings. She has been a U.S. Coast Guard civilian since 2006. She oversees all aspects of the magazine’s production. Her duties also include writing, editing, and coordinating articles related to marine safety, security, and environmental protection. She previously produced magazines for the construction and heating/air conditioning industries and has extensive experience in writing and editing technical articles.

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Endnotes:

- ¹ This was an informal, voluntary advisory service, not operated by the Coast Guard.
- ² “United States Coast Guard Investigation into the Circumstances Surrounding the Collision Between the M/V *Balsa 37*, the Tug *Seafarer*, and the tug *Capt. Fred Bouchard* and T/B No. 155 on August 10, 1993, with no Loss of Life,” by J.W. Calhoun, Captain, U.S. Coast Guard; R.E. Bennis, Commander, U.S. Coast Guard; W.H. Daughdrill, Lt. Commander, U.S. Coast Guard; p. 11.
- ³ Ibid.
- ⁴ Ibid.
- ⁵ Ibid, p. 12.
- ⁶ Ibid, p. 13.
- ⁷ Ibid, p. 14.
- ⁸ Ibid, p. 9.
- ⁹ Ibid.
- ¹⁰ Ibid, pp. 9-10.
- ¹¹ Ibid, p. 19.
- ¹² Ibid, p. 22.
- ¹³ 46 Code of Federal Regulations.
- ¹⁴ Ibid.
- ¹⁵ Ibid.
- ¹⁶ Ibid.
- ¹⁷ For more information on VTS activities, see “U.S. Coast Guard Vessel Traffic Services,” CDR Brian Tetreault, *Proceedings*, Summer 2007, p. 10.



Nautical Engineering Queries

Prepared by NMC Engineering Examination Team



1. The movement of heat within a fluid, caused by the application of thermal energy, is called _____.

- A. radiation
- B. conduction
- C. convection
- D. condo-radiation

2. The high air velocity leaving the air impeller of an exhaust gas turbocharger is converted to pressure in the _____.

*Note: A diesel engine turbocharger is a gas-driven turbine coupled to a centrifugal-type air compressor. The turbine inlet receives exhaust gases from the engine exhaust manifold, causing the turbine wheel to rotate and drive the compressor. The compressor compresses the ambient air and delivers it to the air intake of the engine for combustion. Forcing compressed air into the combustion chambers allows more fuel to be burned in the engine than in a naturally aspirated type of the same size and speed, resulting in a greater power output. In addition, converting some of the energy from the exhaust gas into useful work to drive the turbine increases engine efficiency.**

- A. inlet nozzle ring
- B. turbine wheel blading
- C. diffuser passages
- D. inlet volute

3. Decreasing the frequency in a capacitive circuit while maintaining a constant circuit voltage will result in a/an _____.

*Note: Capacitors are energy storage devices that act to oppose any change of voltage in an electrical circuit when inserted into one. A capacitor will conduct current in proportion to the rate of voltage change, and will pass more current for faster-changing voltages, and less current for slower-changing voltages. Capacitors are utilized in circuits for motor starting, power factor improvement, and as electronic filters.**

- A. increase in apparent power
- B. decrease in circuit current
- C. decrease in capacitive reactance
- D. decrease in total impedance

4. Electrical wire in general, when used aboard vessels, must meet minimum requirements. Which of the following statements is/are correct?

- A. Each wire must be 14 AWG or larger, regardless of locations and use.
- B. Wire must be copper stranded.
- C. The only wire that does not have to be in a suitable enclosure or cover is the ground wire used with portable tools and lights.
- D. All of the above.

* These notes are not supplied on licensing exam questions.

Nautical Deck Queries

Prepared by NMC Deck
Examination Team

Q

uestions

1. What shall be conducted during a fire and boat drill?

- A. All watertight doors in the vicinity of the drill shall be operated.
- B. All lifeboat equipment shall be examined.
- C. Fire pumps shall be started and all exterior outlets opened.
- D. All of the above.

2. INTERNATIONAL ONLY In a narrow channel, a vessel trying to overtake another on the other vessel's port side would sound a whistle signal of _____.

- A. one short blast
- B. two short blasts
- C. two prolonged blasts followed by one short blast
- D. two prolonged blasts followed by two short blasts

3. Under the Pollution Regulations, garbage disposal records must be kept _____.

*Note: Every manned oceangoing ship of 400 gross tons and above; manned, fixed, or floating platform; and manned ship that is certified to carry 15 passengers or more engaged in international voyages are required to keep records of the following garbage discharge or disposal operations: overboard, another ship, reception facility, and incineration on the ship.**

- A. one year
- B. two years
- C. until the end of the voyage
- D. until the next Coast Guard inspection

4. If your vessel must pass through a draw during a scheduled closure period, what signal should you sound to request the opening of the draw?

*Note: 33 CFR Part 117, drawbridge operation regulations, contains general and specific requirements for drawbridges in the United States. A scheduled closure period may be for normal heavy vehicular traffic hours, railroad crossings, or maintenance.**

- A. one prolonged blast followed by one short blast
- B. three short blasts
- C. one prolonged blast followed by three short blasts
- D. five short blasts

* These notes are not supplied on licensing exam questions.



1. A. radiation

Incorrect Answer: Radiation is the transfer of heat in the form of waves similar to light and radio waves, and occurs without physical contact between the emitting and receiving regions.

B. conduction

Incorrect Answer: Conduction is the transfer of heat by actual contact between substances, or from molecule to molecule within a substance.

C. convection

Correct Answer: Convection is the transfer of heat by the circulation of a liquid or gas such as air. Convection may be forced by use of a pump or fan, or it may occur naturally due to heated air or liquid rising and forcing the colder air or liquid downward.

D. conduction-radiation

Incorrect Answer: Conduction-radiation as a form of heat transfer does not exist.

2. A. inlet nozzle ring

Incorrect Answer: The inlet nozzle ring is on the gas side of the turbocharger. The exhaust gas expands as it passes through the ring, which results in the conversion of pressure energy into kinetic energy (velocity).

B. turbine wheel blading

Incorrect Answer: The turbine wheel blading is on the gas side of the turbocharger. The high-velocity gases exiting the nozzle ring are directed onto the turbine blading, which drives the turbine wheel.

C. diffuser passages

Correct Answer: The high-velocity air exits the air-side impeller and passes through the diffuser, where the air is converted into pressure energy.

D. inlet volute

Incorrect Answer: The inlet volute directs filtered air from the engine room or other outside source to the air compressor section of the turbocharger.

3. A. increase in apparent power

Incorrect Answer: Apparent power is the product of the circuit's voltage and current ($S=IE$). Decreasing the frequency in a capacitive circuit while maintaining a constant circuit voltage will result in a decrease in circuit current, and decrease in apparent power.

B. decrease in circuit current

Correct Answer: Alternating current (I) in a simple capacitive circuit is equal to the circuit voltage (E) divided by the capacitive reactance (X_C). Capacitive reactance is inversely proportional to the frequency of the circuit, and a decrease in frequency will result in an increase in capacitive reactance. An increase in capacitive reactance while maintaining a constant circuit voltage will result in a decrease in circuit current ($I=E/X_C$).

C. decrease in capacitive reactance

Incorrect Answer: Capacitive reactance is inversely proportional to the frequency of the circuit ($X_C = 1 / 6.28(f)(C)$). A decrease in frequency will result in an increase in capacitive reactance.

D. decrease in total impedance

Incorrect Answer: Impedance (Z) in a capacitive circuit is directly proportional to the circuit voltage (E), and inversely proportional to the circuit current (I). Decreasing the frequency in a capacitive circuit while maintaining a constant circuit voltage will result in a decrease in circuit current, thus an increase in total impedance ($Z=E/I$).

4. A. Each wire must be 14 AWG or larger, regardless of locations and use.

Incorrect Answer: 46 CFR 111.60-4 states "Each cable conductor must be #18 AWG (0.82MM²) or larger except (a) Each power and lighting cable conductor must be #14 AWG (2.10mm²) or larger; and (b) Each thermocouple, pyrometer, or instrumentation cable conductor must be #22 AWG (0.33mm²) or larger."

B. Wire must be copper-stranded.

Correct Answer: 46 CFR 111.60-11(e) states "Wire must be of the copper-stranded type."

C. The only wire that does not have to be in a suitable enclosure or cover is the ground wire used with portable tools and lights.

Incorrect Answer: 46 CFR 111.60-11(a) states "Wire must be in an enclosure."

D. All of the above.

Incorrect Answer: Choice "B" is the only correct answer.

1. A. All watertight doors in the vicinity of the drill shall be operated.

Correct Answer: During a fire drill you are required to check all watertight doors, fire doors, and fire dampers and main inlets and outlets of ventilation systems in the drill area. §199.180(f)(2)(v)

- B. All lifeboat equipment shall be examined.

Incorrect Answer: Lifeboat equipment is not required to be examined at every drill, but is required to be checked monthly according to §199.190(e).

- C. Fire pumps shall be started and all exterior outlets opened.

Incorrect Answer: Fire pumps are required to be started and two jets of water are to be generated to ensure the system is functioning properly. Not all of the exterior outlets have to be opened, just enough to form two jet streams. §199.180(f)(2)(ii)

- D. All of the above.

Incorrect Answer: Choices B and C are incorrect.

2. A. one short blast

Incorrect Answer: Under inland rules, one short blast means "I intend to overtake you on your starboard side."

- B. two short blasts

Incorrect Answer: Under inland rules, two short blasts mean "I intend to overtake you on your port side."

- C. two prolonged blasts followed by one short blast

Incorrect Answer: Under international rules, two prolonged blasts followed by one short blast means "I intend to overtake you on your starboard side."

- D. two prolonged blasts followed by two short blasts

Correct Answer: When in sight of one another in a narrow channel or fair way, under international rules, two prolonged blasts followed by two short blasts means "I intend to overtake you on your port side."

3. A. one year

Incorrect Answer.

- B. two years

Correct Answer. Garbage disposal records are required to be maintained on the ship for two years following the operation and made to be available for inspection by the Coast Guard. §151.55 (d)

- C. until the end of the voyage

Incorrect Answer.

- D. until the next Coast Guard inspection

Incorrect Answer.

4. A. one prolonged blast followed by one short blast

Incorrect Answer: This is the sound signal required to request the opening of a draw.

- B. three short blasts

Incorrect Answer: This is not a signal required for draws.

- C. one prolonged blast followed by three short blasts

Incorrect Answer: This is not a signal required for draws.

- D. five short blasts

Correct Answer: This is the sound signal required to request the opening of a draw during a scheduled closure.



Missions



Infrastructure



Heritage



U.S. Department
of Homeland Security

United States
Coast Guard

