Round Up



Going underwater at a 100-year-old lock sparks imagination

Text and photographs by Daniel Stainer

District Deputy Engineer Leena C. Hawkins (seen in the far distance) inspects the floor of the primary lock chamber. AY KOCHUGA, THE DIVE PROGRAM COORDINATOR for the Pittsburgh District of the U.S. Army Corps of Engineers, often gets asked about the craziest thing he has ever found in the water at the Emsworth Locks and Dams. After all, the idea of

exploring a nearly 100-year-old navigation structure located about 6 miles down the Ohio River from Pittsburgh Point is bound



to conjure up visions of lost treasure or mysterious sunken ships.

Ten years ago, the last time the district drained the primary lock in a process called dewatering, an old boat prop was found at the bottom of the river

chamber. A decade later, the corps engineers are at it again. Maybe this time around, they will find a perfectly preserved cache of gold bars that fell







off a merchant vessel decades ago. Kochuga laughs at the prospect.

"Unfortunately, about the only thing we ever come across are curious fish," he says.

Dewatering the Lock

PRIOR TO THIS LATEST go-round of dewatering, Kochuga and the other four members of his dive crew were sent into the murky waters. With only six inches of visibility, they were tasked with sweeping debris away from the upper-end and lower-end bulkhead seal areas. The crew also took measurements to make sure that the bulkheads had enough rubber on the bottom to ensure a seal.

"The biggest thing about being a diver for the

Pittsburgh District is that it's considered collateral duty," Kochuga says. "Your primary duty might be as a lock operator, a mechanic or even a resource manager."

Before divers can join this elite team, they must endure a rigorous 18-month training program and pass the required physicals and certifications. The dive team is a small but important part of the roughly 650-person staff at the Pittsburgh District, which oversees more than 328 miles of navigable waterways, 23 navigation locks and dams, 16 multipurpose flood-control reservoirs, 42 local flood-protection programs and other relevant projects within western Pennsylvania, northern West Virginia, eastern Ohio, western Maryland and southwestern New York. (top) Struts are put in place to stabilize and reinforce the aging lock chamber walls during the dewatering process. A freight train passes on the bank next to the lock. (lower right) Tables hold typical dive station equipment that is used during routine underwater inspections and maintenance, including high-tech drones and sonar.



(above) A bulkhead wall is used to isolate the chamber from the river to enable dewatering so that maintenance can be performed on the lock's gates. (below) A tow approaches and prepares to enter the auxiliary lock chamber. Currently, the district is converting Emsworth's aged, unusable downstream lock-draining closure device to a safer maintenance bulkhead system, which is used to dewater the lock so that components that are usually underwater can be accessed for scheduled maintenance and inspection. When placed in front of the permanent lock gates, the dewatering bulkhead holds back the water and allows full access to the gates so that repairs can be performed.

This time around, the engineers will be installing a stainless-steel sill plate and verifying operations of the new bulkhead closure system. With the main chamber drained, repairs will be made to both the



upstream and downstream miter gate anchorages, which act like hinges for the gates to open or close and allow boats to pass between levels on the river. During operation of the lock, these anchorages experience excessive movement and can become severely deteriorated.

When the Emsworth facility opened a hundred years ago, the locks were meant to have a useable operational lifespan of 50 years, which has clearly been surpassed. Repairs to the old chamber, while not a permanent solution, should shore up the facility until a new lock can be built next to the existing structure.

In 2016, Congress authorized \$2 billion to fund the Upper Ohio Navigation Project, which calls for new lock chambers to eventually be constructed at Emsworth and two other lock and dam facilities on the Ohio River. This large undertaking is expected to take the corps a decade or longer to complete.

The Value of Waterways

ORIGINALLY CONSTRUCTED IN 1919 and officially operational in 1921, Emsworth Locks and Dams consists of two lock chambers. The primary lock is 600 feet long and 110 feet wide with side walls that tower to a height of nearly 40 feet. The auxiliary chamber on the river side is 360 feet long and 56 feet wide. This smaller lock will remain open to navigation while



construction takes place on the primary lock. Eventually, this auxiliary chamber will be replaced, too.

About 3,800 commercial vessels pass through these chambers annually, carrying roughly 12 million tons worth of commodities, including road salt, coal, petroleum products, industrial chemicals, sand and gravel, up and down the river. Each year, a thousand recreational boats also travel through the locks. Last year, the 23 navigation locks and dams for which the Pittsburgh District oversees performed 43,000 commercial lockages and 9,000 recreational lockages as an estimated 36 million tons of commodities passed through the upper Ohio River lock system.

Compared to other modes of transportation, the value of this inland navigation system to the nation is immeasurable. In fact, river transportation continues to be one of the most cost-efficient and greenest methods of shipping bulk commodities. The cargo provided by one tow of 15 barges is comparable to what 225 jumbo rail cars or 870 trucks can ship. One dry-cargo barge, for example, can carry 58,333 bushels of grain, enough to make nearly 2.5 million loaves of bread and feed everyone in the state of West Virginia. A liquid cargo barge carrying 27,500 barrels of oil is enough to supply gas to almost 3,000 people for one year.

At a recent media tour at Emsworth, journalists were provided a rare opportunity to walk on the

bottom of the lock chamber and see the old navigation structure up close.

"We're here to learn and to try and make you aware of the great work that our amazing employees are doing every day to ensure that this lock remains reliable well into the future," Pittsburgh District Commander Col. Andrew J. "Coby" Short told the group.

Although no treasure chests or sunken ships were found when the water was drained from Emsworth's primary lock chamber, critical infrastructure projects like this are clearly worth their weight in gold. The movement of commerce and commodities along waterways help to provide jobs in the construction, energy and petrochemical industries, while also supporting the recreational boating industry.

The U.S. Energy Department estimates that shipping bulk commodities along waterways saves around \$7 billion annually. At the Emsworth location alone, one year's worth of shipments equals an estimated \$265 million in savings over using other transportation methods for shipping. The U.S. Army Corps of Engineers' commitment to maintaining superior navigational and operational reliability, therefore, helps to ensure that industries and communities in the Ohio River watershed will continue to reap the dividends for many decades to come. ♥ Crewmembers head back to retrieve more sections of their jumbo barge after locking in the auxiliary chamber. The Emsworth Dam (with its vertical lift gates) is in the background.

-Daniel Stainer writes from Slippery Rock.