

# Saving the Monitor

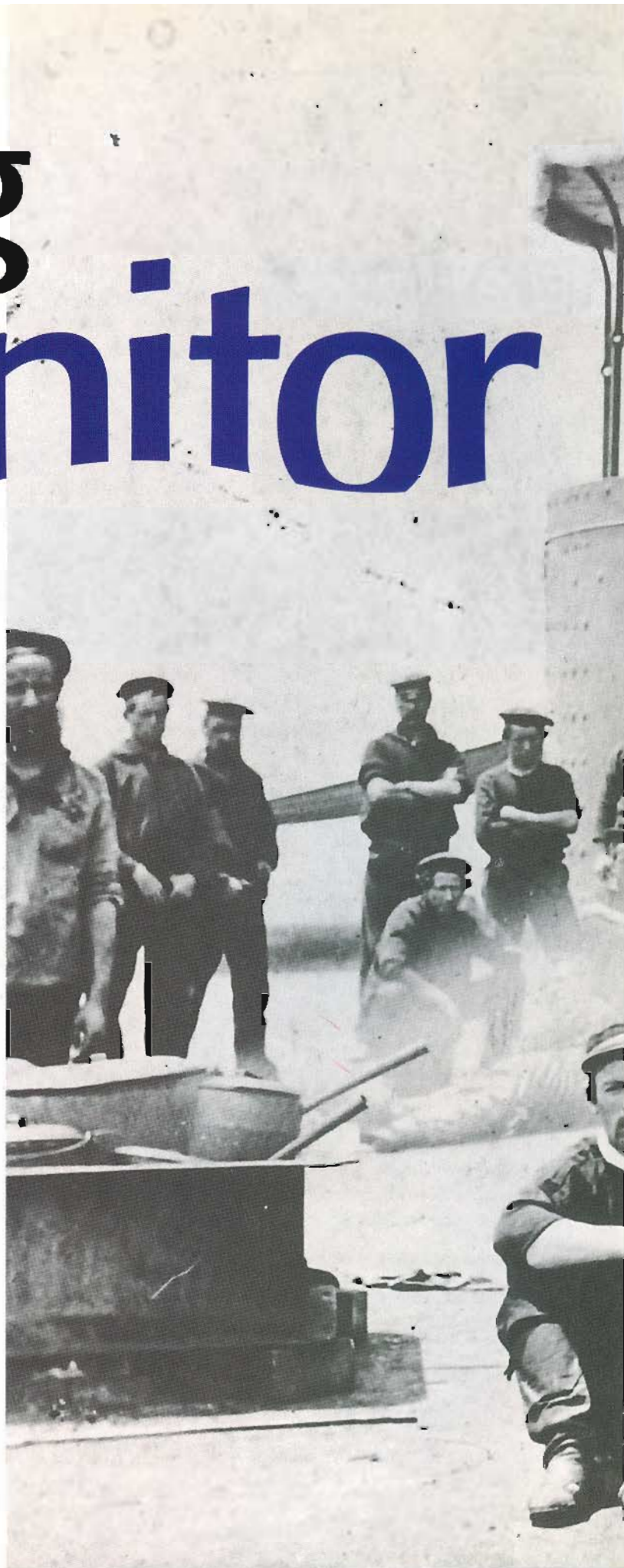
Preserving  
the historic  
**ironclad**  
takes iron  
determination

BY VINCENT RHODES

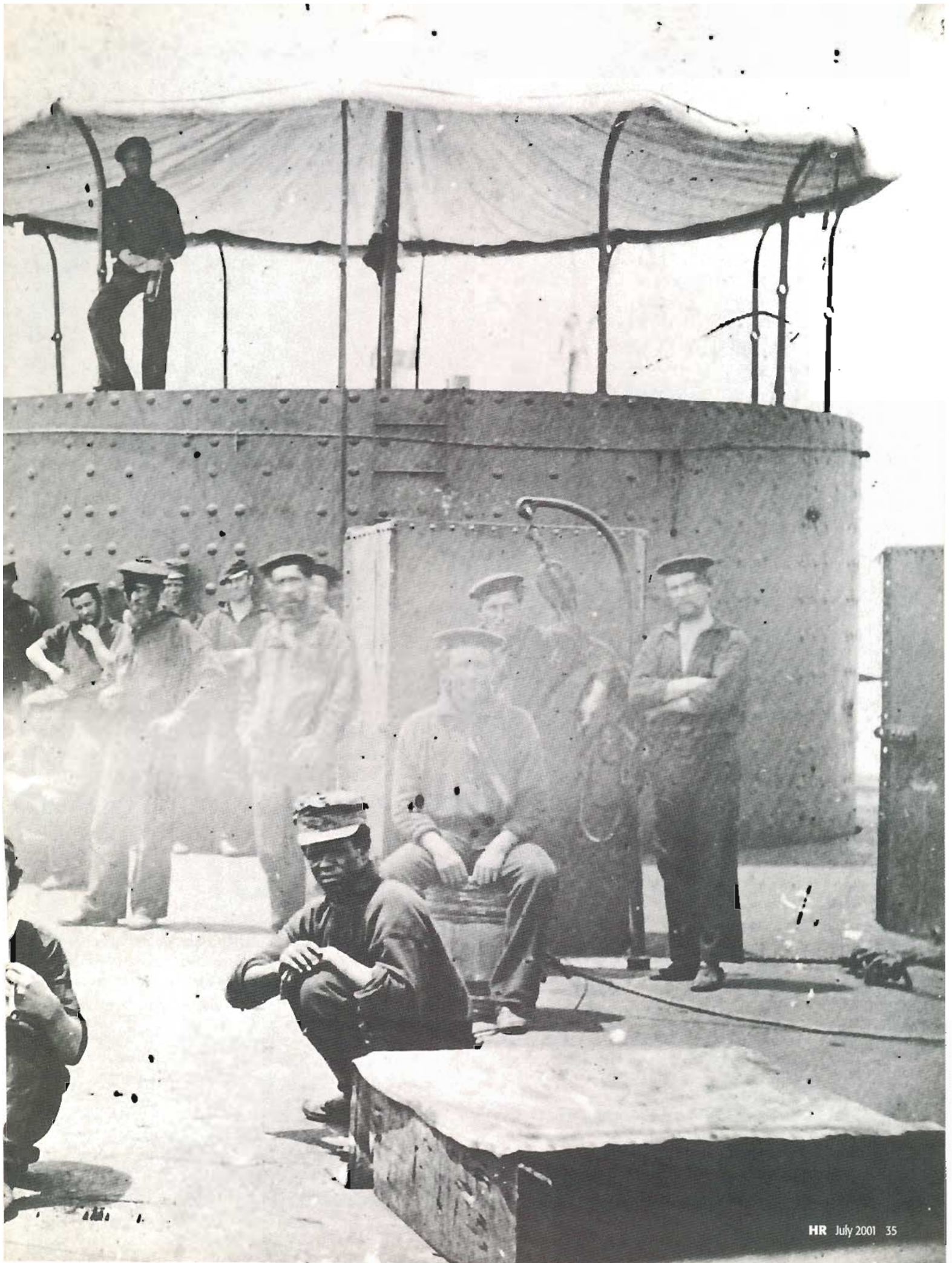
**t**he increasing swells marked the beginning of the end; a trip that had started as a calm voyage from Hampton Roads would soon turn to disaster off the shores of North Carolina. After several historic skirmishes and a pivotal role in the Battle of Hampton Roads, the *U.S.S. Monitor*, the Union's first ironclad ship, was headed down the coast on its next mission.

Some time after noon on Dec. 29, 1862, the *U.S.S. Rhode Island*, a sidewheel steamer, departed the area with the *Monitor* in tow. Around 6 p.m. the ships cleared Cape Henry and began their journey toward Beaufort, North Carolina, in earnest. Their goal: a rendezvous with other Union forces.

As the swells increased on Dec. 30, problems became apparent. One of the ironclad's advantages in combat was the fact that much









of the engine and the crew quarters were below the waterline. Unfortunately, this same design made it easy for water to wash across the decks.

The oakum ropes that had been hammered under the rotating turret raised the structure enough to allow water to splash into the ship with each surging wave. For a time, the pumps kept up with the incoming water; but as darkness fell, the winds increased, driving more water over the deck and into the ship's interior. Water collecting in the hull caused the ship to pitch violently with each surge of the ocean.

As the *Rhode Island* slowed to give the *Monitor* a chance to level, the hawsers slacked and the ironclad's prow plunged into the sea. More seawater surged in. Blowers, meant to vent the fireboxes, channeled water in to dampen the coal fires.

At around 10:30 p.m. it became clear that the *Monitor* had become a liability to its companion ship.

The tow lines were cut, so that the *Rhode Island* could avoid being rammed by the crippled ironclad. A launch and a cutter raced from the sidewheel steamer to evacuate the crew of the sinking steel ship. Men scrambled aboard lifeboats; a few were swept into the water as they struggled to escape.

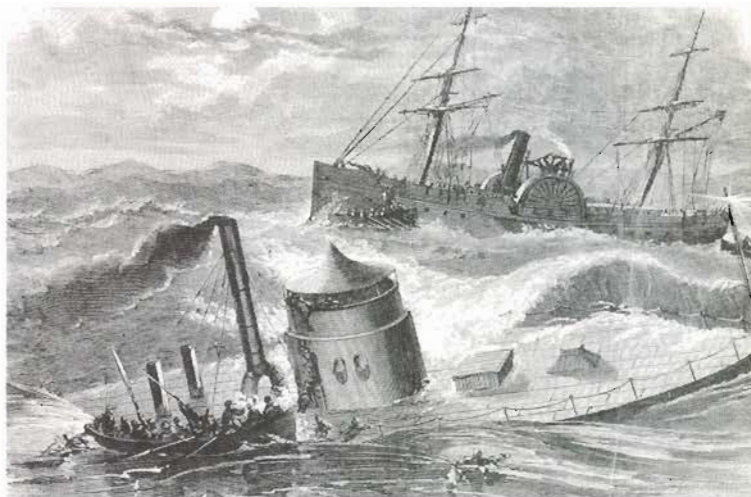
The ironclad was sinking lower and lower in the water. As the rescue boats returned for a third evacuation, their beacon, a twinkling red lantern light atop the turret, winked out. The *Monitor* was sunk and 16 lives were lost.



## Onward

The *Monitor* took roughly 100 days to build and about 24 hours to sink; it lay hidden at the bottom of the ocean for nearly 110 years. Today the *Monitor* is, once again, at the center of a massive rescue effort.

"It's disintegrating into dust," John Broadwater explains. He manages the Monitor National Marine Sanctuary and is



intimately familiar with the ironclad's plight. "The *Monitor* is not like any other vessel. Everyone seems to remember something about it from grade school.

"People are taken up by the challenge and the potential threat of loss. The majority of people say, 'That would be a shame. What can we do?'"

Quite a lot, actually.

Some items have already been recovered from the wreck, including what may have been the last piece of the ship visible before it sank—a red navigational lantern now on view, like many other recovered artifacts from the ship, at The

# Meet the Monitor

**Name:** U.S.S. Monitor

**Beam:** 41.4 feet

**Length:** 172 feet

**Draft:** 9.5 feet

**Displacement:** 1,038 tons

**Armament:** two eleven-inch Dahlgren guns mounted inside a rotating turret

**Designer:** John Ericsson was awarded the \$275,000 contract to build the ironclad and given 100 days to construct the vessel.

**Launched:** January 30, 1862 at Green Point in Brooklyn, New York

**Commissioned:** February 25, 1862

**Special Features:** The *Monitor* was the Union's first ironclad. The idea of armor plating for ships changed the future of the Navy and the rotating turret revolutionized naval warfare. Ericsson's engine was also a new idea. Conventional steam engines had too high a profile to be effective in battle. The pistons' and engine parts' locations made them easy target for the enemy. By using side pistons and creating an underwater screw to move the ship, the engine could be placed below decks and below the water waterline protecting it from enemy fire.







Mariners' Museum in Newport News.

"The lantern was the last thing seen by the *U.S.S. Rhode Island* the night [the *Monitor*] sank," Bill Cogar, vice president and chief curator of the Mariners' Museum, explains.

"It was the first thing recovered. We're fairly sure this was the one put up as dark approached. We think this because it's cracked, and the crack is consistent with the type of damage that would occur when a hot globe is immersed in cold water."

Cogar adds that a number of glass bottles and jars were located and recovered near the wreck. The mustard jars aren't so unusual, but quite a few hair tonic bottles were found. That's not surprising. In 1862 the Secretary of the Navy, Gideon Wells, banned alcohol on ships. "A lot of sailors would bring in hair tonic," Cogar says with a smile. "Of course, it wasn't tonic. It was spirits."

The lantern and glassware make up the Mariners' Museum's "Defending the Seas" collection. A 1,450-pound, four-fluked anchor designed especially for the *Monitor* is the largest artifact. It now sits soaking in a huge tank.

Models, illustrations, historic photos and maps round out the *Monitor* portion of the exhibit. But Hampton Roads locals and visitors alike will see a big change in the years to come.

## On the Horizon

In March, the city of Newport News awarded the Mariners' Museum half a million dollars over the next four years to aid in the planning and development of the U.S.S. *Monitor* Center.

As the designated Principal Museum for all artifacts recovered from the wreck, the Mariners' Museum could create just another exhibit. But that would sell the ship short. "This is quite an important object—a historical icon," Cogar says. He sees the *Monitor* Center becoming a "Mecca for Civil War history and naval warfare technology."

In fact, the goal is to become the definitive national authority and repository for materials, research and programming related to the *Monitor*. That includes examining the naval history associated with the Civil War, describing the strategic importance of Hampton Roads, tying in other Civil War sites throughout the area and attempting to

bring to life the stories of the *Monitor*'s crew.

Exhibit plans for the center include a full-scale replica of the ship—all 170 feet of her. Visitors will be able to walk the deck and see the ship's machinery and crew quarters through cutaway construction of the replica. They might also be able to enter the rotating turret and, via interactive technology, participate in the historic Battle of Hampton Roads. Details aren't yet firm. Counting the museum's investment of internal resources and staffing, planning costs may reach \$750,000. Construction estimates for the facility range from \$25–\$30 million depending on the level of interactivity of the exhibits.

The Mariners' Museum is hoping to complete the *Monitor* Center in 2006 or early 2007 and open its doors in conjunction with the Jamestown 400th anniversary activities scheduled during the same period.

But the facility isn't just another tourist attraction. It's a critical part of the efforts to rescue the shipwreck from destruction. "Had it not been for the museum coming forward, we'd still be trying to raise money," Broadwater says. "It's not ethical to raise objects without the means to conserve them."

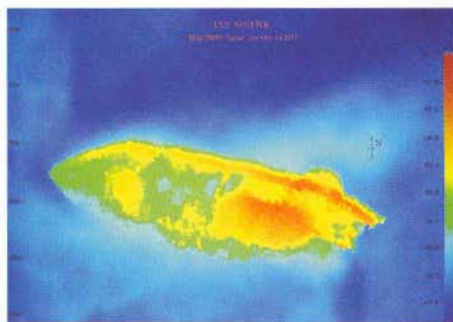
But raising money takes time. Time just may be the enemy.

## To Protect and Conserve

Broadwater has been involved with the *Monitor* since 1973. He'd take annual leave from his job and volunteer to be part of the search and recovery efforts. In 1992, he began working for the National Oceanic and Atmospheric Administration (NOAA) as sanctuary manager. He's been on most of the major expeditions to the wreck and he's seeing differences.

"It's become real clear from all the video and photo work done that things have begun to change rapidly," he says. "Large chunks of the wreck are falling away. Structural pieces have collapsed. We had to make a decision to let it deteriorate naturally or recover components."

This summer, the NOAA team hopes to recover the engine and portions of the ship's armor belt. Plans are being formulated to recover the enormous turret during the summer of 2002. But an artifact that's been underwater over a hundred years can't just be brought to the surface, dried off with a towel and put on display. In fact, recovering the item may just be the easy part. "You don't see many archaeological projects of this scale," Broadwater says. "Recovering the objects is less complicated than the long-term conservation and curation process."







Conservator Curtiss Peterson oversees the efforts to prepare the *Monitor*'s skeg, pieces of deck and hull plating, the propeller and a section of the shaft for display in the museum. The 4,600-pound cast iron propeller and the shaft were recovered

in 1998 and still have a few years to go before they will be ready. That's because the marine environment can be so harsh.

"Recovered metals are covered with corrosion and marine encrustation," Peterson explains. "The surface is not the original material. It's mineralized and there's salt in it. Unless you get the salt out, it goes from liquid to crystal form."

And that's devastating to the artifact. The salt crystals act like frost on the ground. Just as ice crystals can break the pavement, salt crystals can destroy the metal. The worst part? Unless treated, the reaction keeps going in cycles. The salt liquefies, re-crystallizes and destroys another layer, repeating the process again and again. Peterson submerges the artifacts and uses a process called electrolytic reduction to leach salt from the objects and halt the deterioration.

Peterson estimates the conservation of the engine and the turret could take 10–15 years to complete. "The *Monitor*'s engine will be the second largest object after the turret and certainly the most complex to be recovered from the site," Peterson says.

While it is composed of considerably fewer pieces, the turret's conservation will be challenging, too. It's 22 feet in diameter and nine feet high. It will also require a tremendous amount of water to submerge for conservation. And that much

water requires a really big tank. Last September, the Army's 97th Transportation Company from Fort Eustis delivered a 40-ton tank to the museum.

The tank was designed and fabricated over three months in cooperation with Newport News Shipbuilding. The 12,250 cubic foot conservation tank is 35 feet wide on each side and ten feet high. Made from half-inch steel plates, it can hold 91,642 gallons of water.

"Newport News Shipbuilding designed it for free," Peterson says. "They sold us the materials at very good prices, did some of the major fabrication and supplied us with volunteers."



Volunteers from the shipyard completed the approximately 2,000 linear feet of welding necessary to assemble the tank. "They weld five days a week," Cogar says. "And they're coming out on weekends to do more welding. They think it's a great cause."

## Chronology of the Rediscovery of the U.S.S. Monitor

**1945**

**AUGUST**

While testing the newly developed Underwater Object Locator (UOL) Mark IV south of the Cape Hatteras Light in North Carolina, the United States Navy detects a submerged object 140 feet in length. The location in the area of the wreck of the *Monitor* leads to speculation that the unidentified object could in fact be the lost ironclad. However, strong currents prevent divers from accurately identifying the wreck. Although inconclusive, the UOL operation generates enough

interest for the Office of Naval History to open a "Monitor file."

**1952**

Raynor McMullen, a retired postal clerk from Michigan, organizes the U.S.S. Monitor Foundation of Washington, D.C. McMullen offers a \$1,000 reward to anyone who can locate and salvage the *Monitor*.

**1953**

**SEPTEMBER 30**

The Secretary of the Navy officially abandons the *Monitor*, surrendering all claims by the United States Navy to the ship.

**1955**

Corporal Robert Marx, USMC, originates a "shallow water" theory concerning the location of the wreck. Marx claims to have met a sea captain who showed him an old family journal with an entry for January 1865 that detailed a family picnic at Hatteras where the "Yankee Cheesebox" was visible in the surf near the lighthouse. Marx claims to have discovered the *Monitor* in 45 feet of water and to have put his name in a bottle and placed it on the wreck. The

wreck is not located during subsequent searches.

**1967**

The State of North Carolina passes legislation requiring anyone engaging in salvage operations within state waters to obtain permits from the state.

**1970**

Captain Ernest W. Peterkin of the Naval Research Laboratory begins an exhaustive study of navigational information from the U.S.S. *Rhode Island*.





## The Recovery Program

**T**he violence of the sinking is just a memory. All that remains is the calm of the sea blanketing the wreck like the coral and sponges that eclipse its surface. Occasionally the gurgle of exhaled bubbles breaks the thick silence. Because of the depth, much of the ambient light vanishes. In the dark bluish glow, an unmistakable shape rises from the sand flats. The ship lies upside down propped on its turret.

"It's an incredible sense of awe," says Jeff Johnston, a NOAA program specialist for the Monitor sanctuary, "especially if you're coming out of the murk. All of a sudden, in front of you is the turret. It gets you every time."

The depth that shrouded the ironclad for so long makes recovery efforts difficult. Expeditions require much planning, personnel and equipment. Around \$7 million will be spent on summer recovery efforts—about the same budget as last year.

Another difficulty is the location of the wreck. The *Monitor* sits in 240 feet of water about 16 miles off the coast of Cape Hatteras. That's not in U.S. territorial waters. Since antiquities

laws on the books didn't apply to the wreck, the governor of North Carolina nominated the site for protection under a new law. And in 1975 the government declared one square mile surrounding the historic vessel a national marine sanctuary—the nation's first underwater preserve.

In some respects, it's a miracle that the wreck survived this long. One common rumor holds that the *Monitor* was depth charged during World War II for fear that it was a German U-boat. The area is also known as "Torpedo Alley" and there's evidence of explosions as little as three to four miles from the wreck.

Because the ironclad is so far offshore, a number of support vessels are required for each expedition. In fact, about 100 people will be housed on site in June and July to staff the 45 days of round-the-clock dive operations. A barge that typically accommodates 60–70 people will be mobilized in New Orleans and towed to the sanctuary.

"The weather is another big obstacle," Broadwater says. "Hatteras definitely earns its name as 'Graveyard of the Atlantic.'"

## Dangers in the Deep

**T**he wreck lies near the confluence of two currents at Diamond Shoals: the cold Labrador Current from the north and the warm Gulf Stream from the south. The meeting of those currents can cause sudden storms.

Even when the weather cooperates, diving on the *Monitor* can be tricky. Currents flow in one direction at the surface, in another direction 50 feet down.

The depth factor also poses problems. As a diver descends, the body begins to absorb nitrogen. That's not a problem until the diver begins to ascend. If a diver ascends before the nitrogen releases from the tissues, the nitrogen comes out of solu-

### 1973

#### MAY

The U.S. Monitor Foundation and Underwater Archaeological Associates claim to have found the *Monitor's* turret using sonar. A buoy left at the site is later destroyed by a passing ship.

#### JUNE

The U.S. Monitor Foundation unsuccessfully attempts to relocate the site of the turret.

#### JULY

Midshipmen at the U.S. Naval Academy formulate a plan to search the area off the Cape Hatteras Lighthouse using a magnetometer. The search is canceled due to adverse weather conditions.

#### JULY 17

A U.S. Navy RP-3D, using a highly sensitive magnetometer, conducts a four-hour, low-altitude search of the area around the Cape Hatteras Lighthouse.

#### AUGUST

Duke University, the Massachusetts Institute of Technology (MIT), National Geographic, and the North Carolina Department of Cultural Resources participate in an expedition using Duke University's Research Vessel Eastward. The expedition has two objectives: a geological study of the continental shelf and a search for the *Monitor* using the track and log of the *U.S.S. Rhode Island*. Twenty-one sites are iden-

tified as vessels other than the *Monitor*. On August 27, the last scheduled day of the expedition, side-scan sonar records a "long amorphous" echo. Three additional days are spent collecting data at the site. Faulty cameras record fuzzy images of a flat surface that appears to be iron plate, and a "circular protrusion" similar to a turret. An underwater camera designed by Dr. Harold Edgerton of MIT snags on the wreck and is lost.

#### SEPTEMBER

"Project Cheesebox" is organized at the Naval Academy. A full investigation of the *Monitor's* plans, historic records, logs, etc., is combined with information

concerning the recent wreck discoveries by various organizations. This information is included in a study conducted by midshipmen specializing in history, engineering, oceanography, ocean engineering, and international relations.

#### OCTOBER

As part of their study, the Project Cheesebox participants develop a test tank model of the *Monitor* in order to study possible sinking scenarios.

#### NOVEMBER-DECEMBER

In late 1973 plans are developed for an expedition to revisit the site located by the Eastward using the Alcoa Seaprobe. **HR**



tion, forming bubbles that damage the joints and other areas. Early divers seized up from pain and couldn't move, earning decompression sickness the name "the bends"; it can be incredibly painful and even impair a person for life.

The diving on the *Monitor* far exceeds the limits familiar to recreational divers. The recreational depth limit is 130 feet; a person using that profile can have a total dive time of no more than 10 minutes and still be able to ascend directly to the surface. In contrast, the crews diving on the ironclad will log dives of 240 feet for about 40 minutes. Their bodies will have absorbed too much nitrogen to allow a direct ascent to the surface. Instead, divers will spend around two additional hours in the water, decompressing at shallower depths.

Forty minutes doesn't allow much time to complete tasks. "Even on the longest dives, you're lucky to get in 25 minutes of work," Broadwater says. That's because divers have to leave time to retrieve the umbilical and tools.

As depth increases, divers breathing air suffer from narcosis—an intoxication brought on by the increased concentration of nitrogen. It's similar to a feeling of drunkenness that abates immediately as a diver ascends. The more serious problem,

however, is the oxygen content. The gas so vital to human life becomes toxic at depth. Since ordinary air won't work, Navy divers use a mix of helium and oxygen for breathing.

## Underwater Construction

Despite the difficulties, the conservation project has made great strides. Last year divers focused on stabilizing the wreck to prevent further destruction.

Because the ironclad lies upside down propped on its turret, tremendous stress is placed on the hull. Divers placed 6-foot by 12-foot canvas bags sewn in levels beneath the wreck; each level was then filled with grout until the bag expanded enough to come in contact with the hull of the ship. While this support doesn't relieve the stress completely, it will prevent further damage if the entire hull gives.

The *Monitor* expeditions in 2000 also lowered a 90-ton steel frame over the wreck. In a process similar to the one used to salvage the *Hunley* in Charleston, South Carolina, this Engine Recovery Structure will allow divers to separate the engine from the wreck and strap it into a harness before connecting it to a surface crane. Because the surface crane is as long as a football field, it cannot be connected directly to the engine without jeopardizing the entire wreck. Any swell on the ocean would be amplified by the crane's length. It could literally rip the engine from the bottom and break the wreck into pieces.

## Human Remains a Possibility

Broadwater thinks it's likely that raising the turret in 2002 will be the last of the major recoveries. And he's thinking that expedition just might recover a bonus—the two eleven-inch Dahlgren guns that made the *Monitor* such a threat.

There's another very real complication. "The *Monitor* is potentially a grave



## Confederate Ingenuity Changed the Face of Naval Warfare

LOCAL AUTHOR DETAILS THE LIFE AND DEATH OF THE C.S.S. VIRGINIA

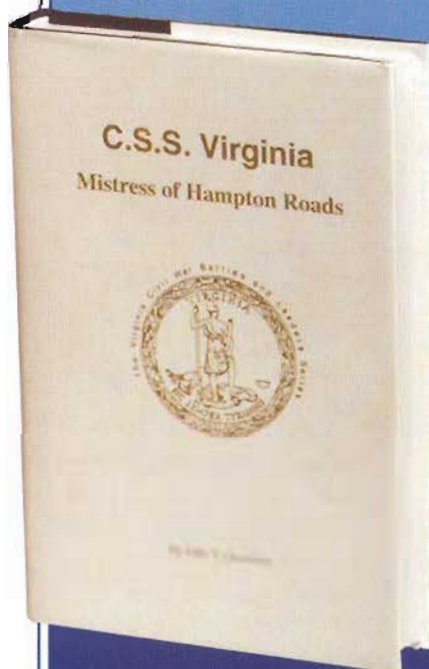
As the National Oceanic and Atmospheric Administration (NOAA) prepares to raise the *U.S.S. Monitor's* engine and portions of the ship's armor belt this month, and the turret—22 feet in diameter and nine feet high—in 2002, author John V. Quarstein, local historian and Director of the Virginia War Museum, offers a look at its counterpart—a nemesis to the Union Navy during the Civil War's Peninsula campaign of 1862. Quarstein most recent work, *C.S.S. Virginia: Mistress of Hampton Roads*, is a 367-page saga that traces the history of the Confederate gunboat from its capture as a Union 40-gun

frigate named the *Merrimack* through its conversion at Gosport Naval Yard into an ironclad to the ship's scuttling along the James River in May, 1962. Woven within the text are narratives of the crewmen and their lives both during the war and in the antebellum South.

Quarstein doesn't miss a beat. He meticulously details the workings of the ship, including its flaws and difficult handling abilities. He writes: "The *Merrimack* was completely reconfigured during its conversion. A 178-foot long slope-sided casemate, covered by four inches of ironplate bolted to 24 inches of oak and pine backing, was constructed atop the ship's charred hull. The ironclad was armed with six 9-inch Dahlgren smoothbores, two 6.4-inch Brooke rifles and two 7-inch Brooke rifles, which served as pivot guns. A six-foot-long, 1,500-pound cast iron ram completed the vessel's weaponry."

As Quarstein's book reveals, the *C.S.S. Virginia* was not only a test of Confederate ingenuity, but it also altered a quick end to the American Civil War and put an indefinite end to wooden vessels in naval combat.

—L. Penion





for 16 people," Johnson says.

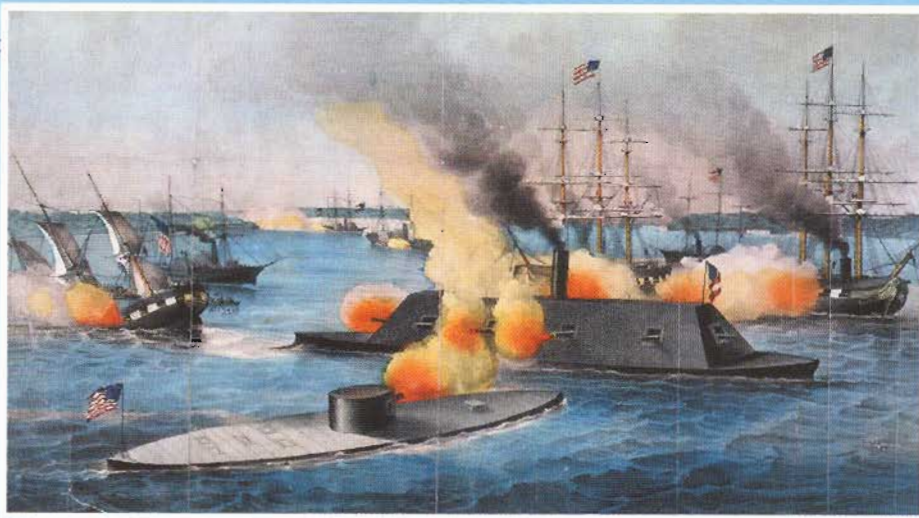
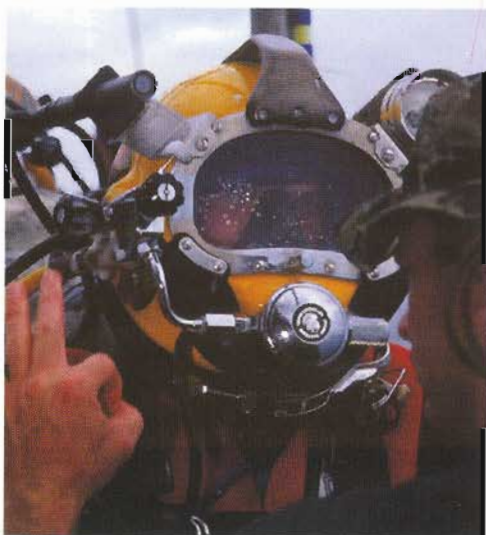
"That's something we never let people forget." No remains have yet been discovered, but that may be because recovery efforts thus far have concentrated in the engine areas, not crew quarters. The turret, however, was the only way in and out of the boat; and the conditions make it possible for organic materials to survive a long time.

Broadwater says that the team is prepared for the possibility of finding human remains. "In the event we encounter anything that could be human," he says, "we'll stop activities, take video, have archaeologists look at it and then move more slowly. This excavation will be treated with the utmost respect. These people probably have living relatives and we want to treat [the sailors] with the highest honors."

"Forward of the bulkhead are the crew's living quarters," says Broadwater. "The forward section is pretty stable. The archaeological aspects are very exciting." "We've had a lot of divers come back up and be pretty emotional. I've had divers come back up and hug me for making this possible. It makes us feel like we're really doing our jobs well."

"But with technical divers, it's a small group," he adds. "If we can bring up all these components, it's unlimited. Everyone can see them."

And that's what makes the Monitor Center so important. "We're unbelievably excited," says Cogar. "It's one of those projects that's so beneficial to so many people. I believe it will really help to make Hampton Roads a destination. This will be another reason that people will visit Hampton Roads from around the country and around the world." **HR**



## The Battle of Hampton Roads

The Battle of Hampton Roads would never have occurred had the North not adopted the Anaconda Plan. The plan required that the Union Navy blockade all major port cities of the South.

After Virginia seceded from the Union, Confederate forces gained control of the Gosport Navy Yard in Norfolk and all the cannons, ammunition and ships stored there. One of the most important acquisitions was the *U.S.S. Merrimack*, the most powerful ship in the navy; it measured 270 feet in length and carried forty cannons. Because it was in the Gosport Yards for repairs, the *Merrimack* could not be evacuated. The navy ordered the ship set afire rather than let her fall into the hands of the Confederate forces. It burned to the waterline and sank, but was eventually raised by the Confederacy.

The South realized it must break the blockade or lose the war. Union forces held Fort Monroe across the James River from Norfolk and had 17 ships blockading the river. The Confederate plan was to rebuild the *Merrimack* as an ironclad.

When the North discovered the plan to break its blockade, the Navy began looking for a way to build an ironclad of their own. Swedish-born engineer John Ericsson submitted plans and was awarded a contract to build the *Monitor*. On March 6, 1862 the ship sailed to meet her Southern ironclad counterpart. Two days after the *Monitor* left New York for Hampton Roads, the *Virginia* left her dock and challenged the Union block-

ade. As the *Virginia* moved to attack the opposing ships, Union vessels launched cannonballs that merely bounced off its armor plating.

The *Virginia* (re-named) proceeded to ram the *U.S.S. Cumberland* and sink it. It then attacked the *U.S.S. Congress* at close range, forcing it to surrender and leaving behind a burning wreck. As the *U.S.S. Minnesota* attempted to aid the *Cumberland* and *Congress*, it ran aground in the shallow water of the James River. The retreating tide forced the *Virginia* to turn away from the crippled vessel. In fewer than four hours on March 8, 1862, the ironclad sank two ships and killed over 300 Union sailors.

By the time the *Monitor* arrived at the scene, the *Virginia* had returned to the docks. It took station by the *Minnesota* with orders to protect the grounded ship at all costs. When the Southern ironclad returned on March 9, the first conflict between two armored ships began. During the four-hour battle, the ships were almost close enough to touch. Neither vessel was able to gain the upper hand, however, and the conflict ended in a draw. It was the only time the ironclads engaged each other in battle.

On May 10, 1862, Union forces attacked and captured Norfolk forcing the Confederacy to abandon the Gosport Yards. The *Virginia* was too large to move up the James River with the retreat. In a familiar gesture, the Southern troops set fire to the ship rather than let it fall into the hands of the North. When the fires reached the ship's powder magazine, the ship was blown to pieces by the explosion.