

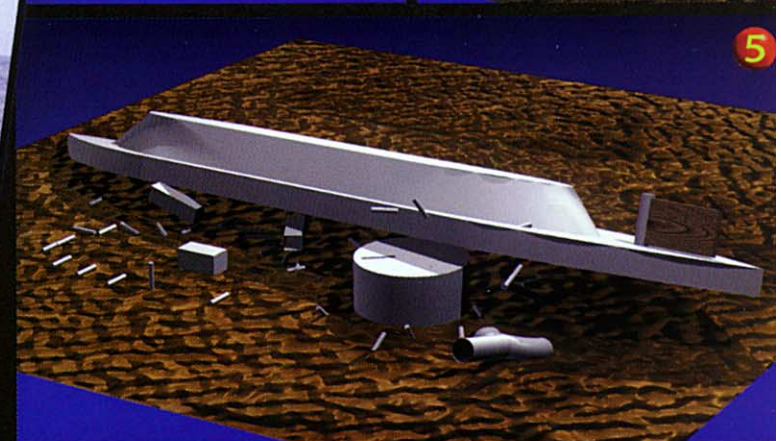
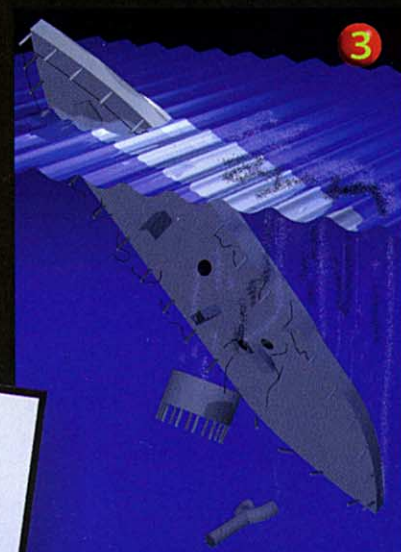
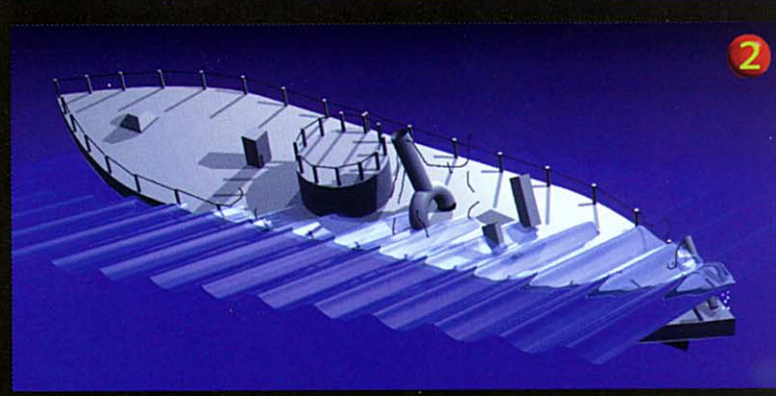
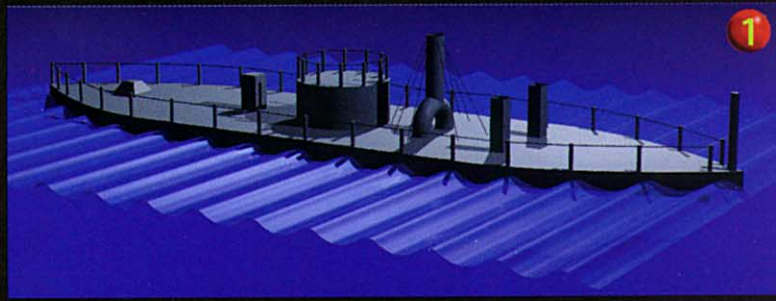
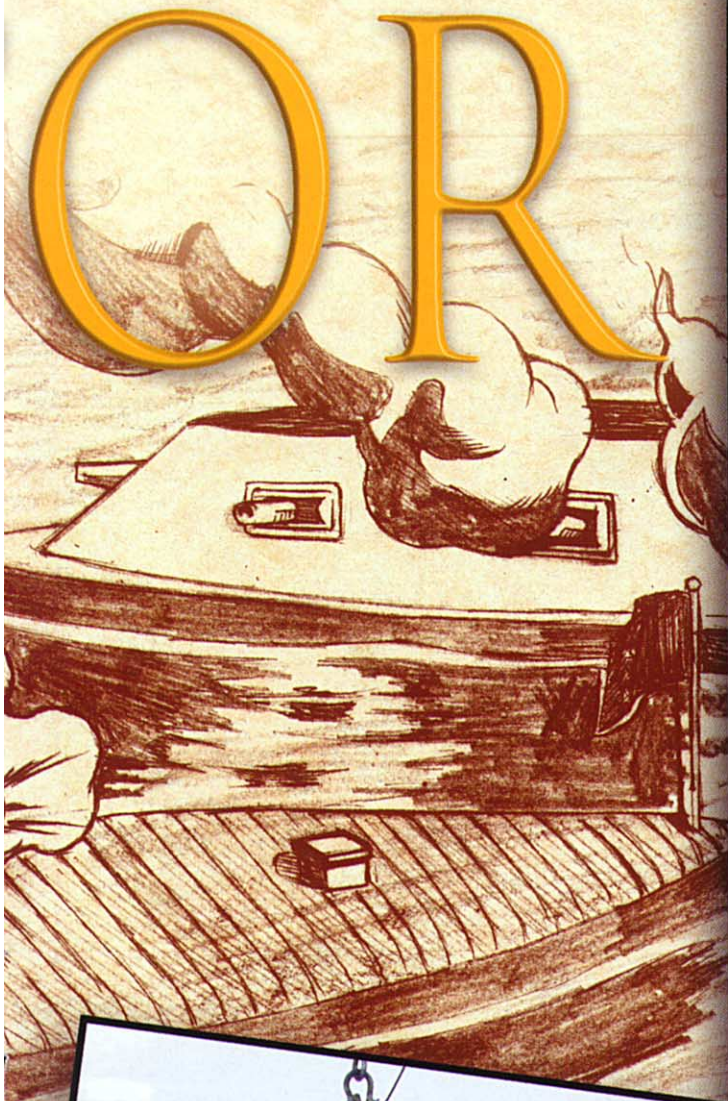
# MONITOR



THE CAMBRIAN FOUNDATION'S 1998 EXPEDITION TO THE *MONITOR*, THEIR FOURTH, ALLOWED CIVILIAN DIVERS TO WORK OFF OF NAVY AND NOAA SHIPS AND DEMONSTRATE THIS 'NEW UNTETHERED DEEP SCUBA DIVING' TO THE BOYS FROM THE OLD SCHOOL.

COMPILED BY **TERRENCE TYSALL,**  
**KYLE GREAMER AND DARYL CARSON**

p. 20: Illustration by Allen Holt  
p. 21: Illustration by Curt Bowen



Above: How did the *Monitor* end up upside down? Researchers believe the ironclad sank stern first, rolling over as she dropped. The turret fell away, landing on the bottom first and then catching the side of the ship as she hit the sand.

*Inset:* Navy hard hat divers are lowered in a "basket" to continue salvaging the prop and shaft from the *Monitor*. The wreck lies in 240 feet of water off the coast of North Carolina.

The 300-foot-long *Kellie Chousest*.

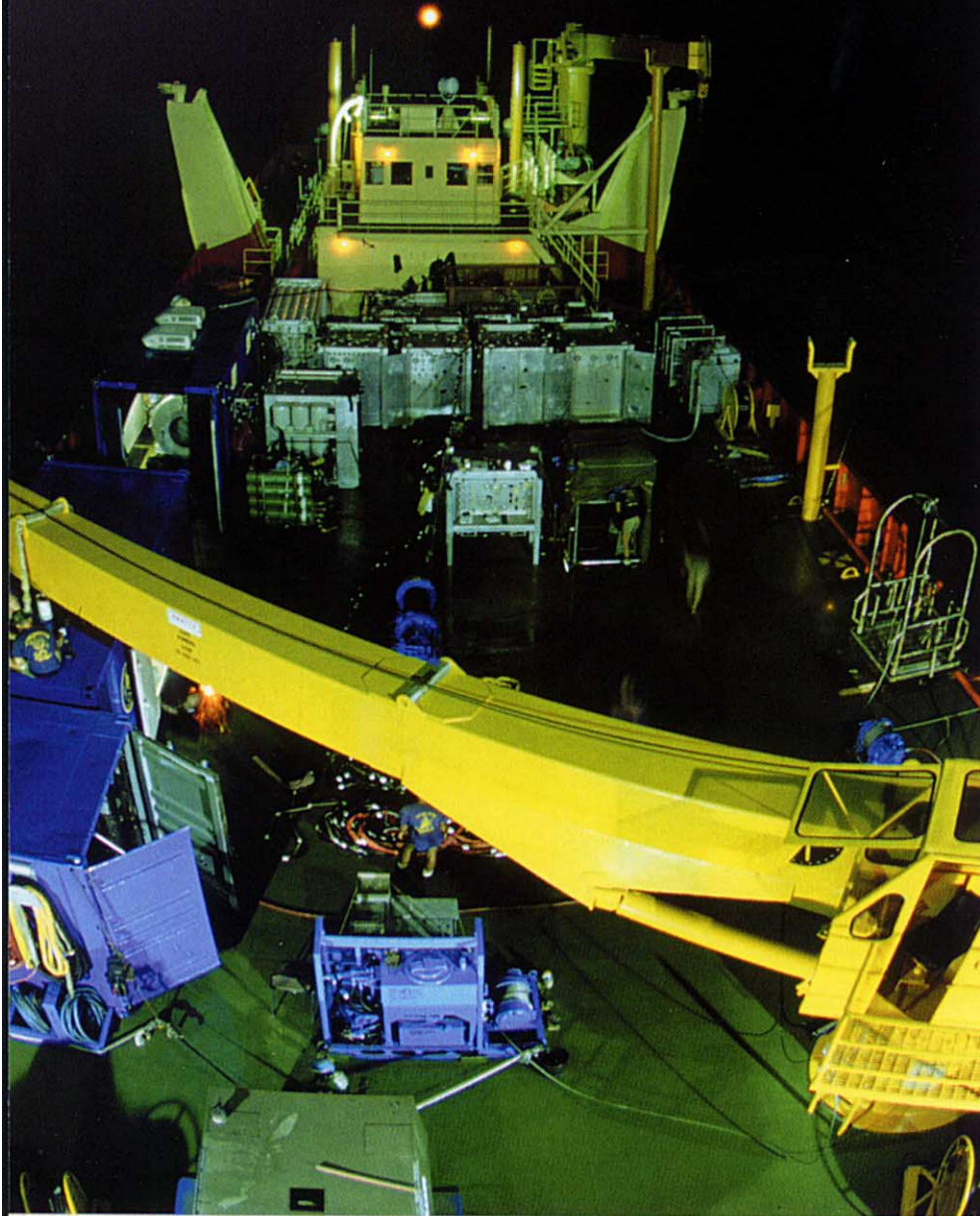


photo by Thaddeus Bedford

“The Navy guys were all excited because their commander made a 37-minute dive that required special pre-approval. So, naturally, we had to make a 40-minute dive just to sort of tweak their noses,” says Terrence Tysall.

The dives were part of the 1998 *Monitor Expedition* in which Tysall, head of the Cambrian Foundation, led a team of divers in a joint expedition with the United States Navy to gather data and recover artifacts from the *USS Monitor*, sunk in 240-foot-deep water off the North Carolina coast.

Diving alongside a Navy hard hat team was certainly unique for a group of civilians trained under the umbrella of recreational agencies like TDI and IANTD. In addition, three of the divers were from the National Oceanic and Atmospheric Administration. “Part of our purpose for being there,” Tysall explains, “was to help NOAA validate this new style of diving (untethered deep scuba diving).”

The end result was a group of civilian-trained tech divers (some of whom were from government agencies) working next to government-trained hard hat divers. Some friendly competition was probably inevitable. “The Navy guys made a record 110 dives,” says Tysall, “and we totaled 131.”

But Tysall is also quick to explain that the job would not have been possible without the Navy. They had the heavy lift capability necessary for retrieving the *Monitor*'s prop and their ship had the hyperbaric chamber that added a huge margin of safety to all of the diving operations. “It was really pretty cool,” he says. “We worked well together and there were some tensions, but that’s why you have strong leaders on both sides. And, supposedly we’re out there to help preserve one of America’s great shipwrecks.”

The overall objectives for this project were to collect data for an engineering

The shot and shell from the Confederate ironclad *CSS Virginia* tore through the unarmored wooden hull of the *USS Cumberland* as if it were made of paper. Each shell that ripped into her unprotected interior carried with it huge splinters that dealt death and destruction in wholesale fashion.

Acting Master's Mate Charles O'Neil aboard the *Cumberland* wrote: “Several shot and shell entered on one side and passed out

## HEAVY METAL HISTORY

through the other carrying everything before them.” Master Moses S. Stuyvesant later described the scene as “A scene of carnage and destruction never to be recalled without horror...The once clean and beautiful deck was slippery with blood, blackened with powder and looked like a slaughter house.”

Newspapermen watching the action from shore recalled the scene. “Now she [the *Virginia*] nears the *Cumberland* sloop of

war, silent and still, weird and mysterious, like some devilish and superhuman monster, or the horrid creation of a nightmare. Now but a biscuit toss from the ship, and from the sides of both pour out a living tide of fire and smoke, of solid shot and heavy shell. We see from the ships scuppers running streams of crimson gore.”

Approximately two hours of this action occurred when Lieutenant John Taylor Wood of the *Virginia* declared that “no ship ever fought more gallantly” as the *Cumberland* slipped beneath the waves. It was 3:35 p.m. when the order to abandon the *Cumberland* was given. She settled on the bottom with her masts still showing above the surface, her flag flying smartly. It was now the *Congress*' turn to die.

It was nearly four in the afternoon when the seemingly invulnerable *Virginia* started to ravage the helpless *USS Congress*. She stood off about 200 yards and repeatedly raked the union

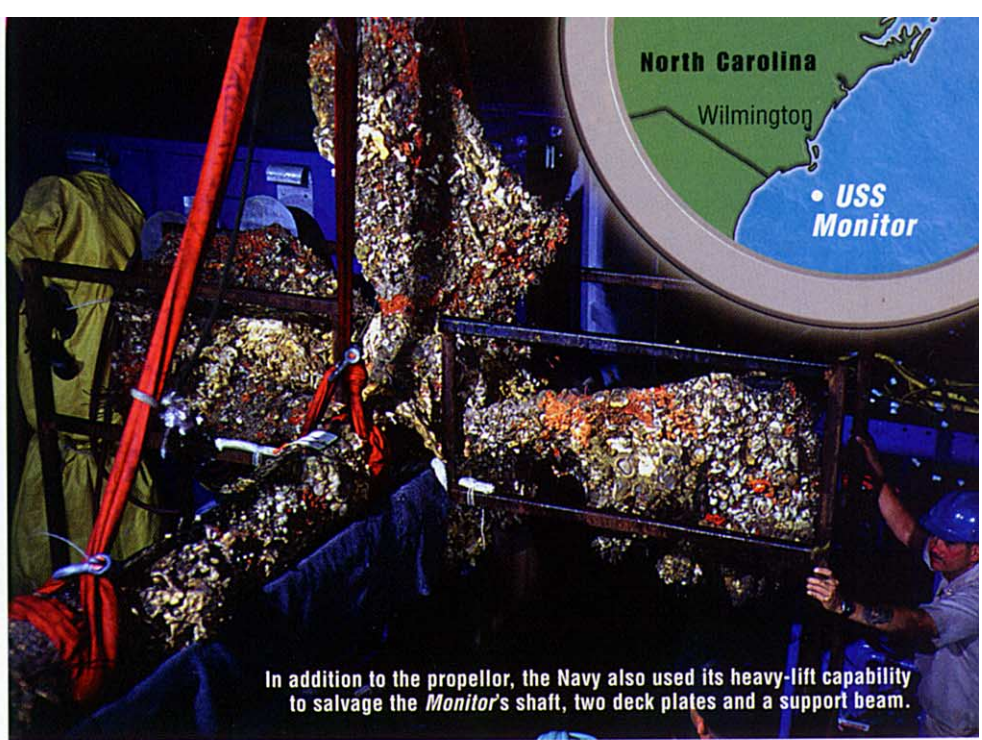
study for stabilization and recovery efforts of the wreck and to map, photograph, film and recover small artifacts that might be destroyed during the stabilization.

Phase I of the operation was conducted off the 300-foot-long *Kellie Chousest*, a leased DSRV support vessel, placed on a four-point mooring directly over the *Monitor*. Phase II was conducted by NOAA, NURC at UNCW (National Undersea Research Center at the University of North Carolina at Wilmington) and the Cambrian Foundation off the 140-foot-long NOAA vessel *Ferrell* and UNCW's research vessel, *Cape Fear*.

The Navy's operation was separate and similar to how NOAA divers had been required to dive in the past. The Navy divers spent the majority of their efforts on the removal and recovery of the prop and shaft. They also brought up two deck plates and a support beam. Their divers were lowered down over the port side of the *Kellie Chousest* two at a time on a large, metal basket called a stage. Once on the bottom they would step off the stage next to the wreck and walk over to it. Their helmets were tied to the surface with an umbilical that contained a communications cable, a hot water line for their suits, a "numo" tube for determining depth and a gas supply line.

Decompression was handled by "Sur-D" diving. This means that after about one hour of in-water decompression at their 40-foot stop, they would be quickly removed from the water, stripped from their gear and hurried into the hyperbaric chamber, where they would spend another 90 minutes.

In contrast, during Phase I the Cambrian teams were lowered on the DSRV platform or did a giant stride into the water, where they swam over to a downline that was affixed to the stern of the *Kellie Chousest*. During Phase II, they did live-boat operations off the *Cape Fear* and used a downline attached to a large Norwegian ball, for which the divers all had to be



In addition to the propeller, the Navy also used its heavy-lift capability to salvage the *Monitor's* shaft, two deck plates and a support beam.

completely suited up, with mask, fins, doubles and stage cylinders. When the captain yelled, "DIVE, DIVE, DIVE!" the divers went over both sides of the boat one after another, like paratroopers leaving an airplane. The divers drifted into the buoy line and pulled themselves down, hand over hand.

Bottom times ranged from 15 to 40 minutes using an 18/50 trimix, although some Cambrian members used mixes with higher than normal ENDs as training for more demanding projects the Foundation conducts. Divers were able to place markers, take engineering measurements and recover small artifacts (including the first below-the-waterline marine flush head). They also tracked the movement of artifacts and the deterioration of the wreck using markers placed from previous years' work.

Decompression was done with the team members drifting under the float ball line that had been attached earlier. When the last

diver reached the line, it was unhooked and the divers drifted with the float as a reference. The boat simply followed along and picked up the divers as they came to the surface. Divers decompressed on nitrox mixtures and pure O<sub>2</sub>. Total run times were 100 to 120 minutes.

The difference in resources needed to run these two dive operations was significant, to say the least. The Navy's longest bottom time was 37 minutes and each hard hat dive consumed about 1000 cubic feet of 14/86 heliox. Compare this to the free-swimming Cambrian team members who typically used only 150 cubic feet of trimix on the bottom.

Also, each two-man team of Navy divers required at least 16 personnel on the surface—a hoist operator, umbilical line tenders, gas supply technicians, communications operator, safety diver and tenders, chamber operator and tender and a dive supervisor.

vessel and her consort laying close abeam to protect her from ramming by the Confederate behemoth.

After almost an hour of unceasing, murderous fire, her decks a ruined slaughter pen, the commander of the Union vessel struck his colors and surrendered. It was during the formal surrender that the *Congress'* fate was sealed.

When the boarding party was returning to the *Virginia*, union troops from shore began firing on the party, either uncaring or unaware of the existing state of truce. Several men were wounded critically, including the *Virginia's* captain, Franklin Buchanan. Wounded through the thigh, Captain Buchanan fumed with rage as he gave the order, "Destroy that goddamned ship!"

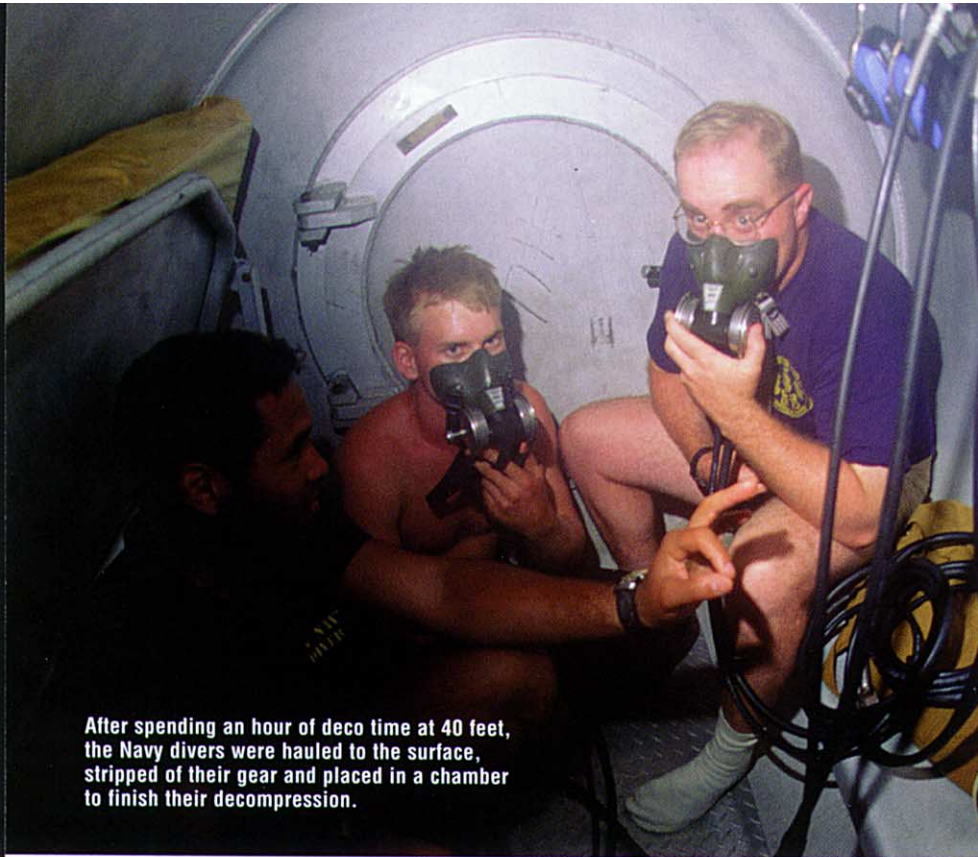
The *Congress*, abandoned and burning, left a backdrop of destruction as the sun faded and the victorious *CSS Virginia* retired for the night. This was to be the worst defeat in US naval history until 79 years later at Pearl Harbor.

This was the scene when, after the *Congress'* fiery end, the

diminutive *USS Monitor* arrived as David before Goliath.

Ironclad ships had been built before by navies in Europe and the East, but never before had two met in battle. The *Virginia* was an adapted wooden ship, the former *USS Merrimack*. She was constructed in this manner out of necessity for time and money. The Union had started construction on an ironclad ship, the *USS Galena*, of similar design. However, when it was apparent that the Confederates would have their ironclad ship ready before the Union's, they started on a revolutionary project that would produce a ship that would influence all warship design in the future.

On March 8, 1862, the *CSS Virginia* steamed down the Elizabeth River to Hampton Roads, where five large union ships (the *USS Cumberland*, the *USS Congress*, the *USS Minnesota*, the *USS Roanoke* and the *USS St. Lawrence*) were in blockade. At the end of this day, the *Cumberland* and *Congress* were sunk and the *Minnesota* was grounded and severely damaged.



After spending an hour of deco time at 40 feet, the Navy divers were hauled to the surface, stripped of their gear and placed in a chamber to finish their decompression.

The Cambrian team, on the other hand, supported up to 10 divers with only six extra personnel—two in-water support divers, one standby diver, one safety diver, a chase boat operator and the dive supervisor. The support divers were diving air on their backs and would each carry one stage cylinder of EAN36 and one of O<sub>2</sub>. The standby diver, who also had air on his back and two stage cylinders, was located in the chase boat (an Avon or Zodiac inflatable) while the safety diver was on deck with trimix on his back and two stage cylinders.

As mentioned before, the Navy had the heavy lift capability required for lifting the large sections of the wreck. But the free-swimming divers' maneuverability allowed them to traverse the entire wreck on any dive and to document the site more

easily and to collect small artifacts – all with far fewer monetary and personnel resources. This efficiency caught the attention of NOAA and prompted their request to have Tysall train three of their divers in preparation for this expedition.

"In all, we trained three NOAA divers, three from NURC and one of our own Cambrian people," says Tysall.

Tysall says the course stresses deep air ability as well as trimix training. "Trimix is obviously the best, but in the field you don't always have what's best," he says. He also tries to take his students deeper than their final objective. For working on the 240-foot *Monitor*, for instance, check-out dives on the wreck of the *E.M. Clark* at 260 feet deep. He says it eliminates the mystery associated with a specific depth

and allows the divers to focus on their tasks for working dives. This particular course consisted of two weeks of diving in the Florida Keys and an additional week off of Cape Hatteras before the expedition.

"The opportunity to train these NOAA divers came from four years of quietly working alongside them in the sanctuary. Instead of being antagonistic, we simply proved ourselves," says Tysall, who has held a research permit to dive the *Monitor* for the past four years. The permits must be approved by NOAA and the North Carolina government and have allowed Cambrian team members to help in the preservation effort of the historic ironclad.

It also allowed NOAA to witness the effectiveness of the Cambrian Foundation's diving techniques. "We simply demonstrated capabilities that NOAA and the Navy didn't have," says Tysall. "For instance, the Navy's max depth for use of their Superlite helmets is 300 feet. When we dove the Belize Blue Hole, our first deco stop was deeper than that."

Tysall's budding relationship with NOAA has placed him in some unique situations. After the *Monitor* project, he was asked to go to Hawaii and supervise the diving operations of a Monk Seal study requiring dives to 240 feet on trimix. And he's also been asked to testify before a Congressional sub-committee on the *Monitor* project and the "new" diving techniques the team used.

But the icing on the cake for the Cambrian Foundation will be a reciprocity agreement between with NOAA and the Navy. If approved, the agreement will allow team members to work and dive off of Navy and NOAA ships for dozens of research projects around the globe. **DI**

*The Cambrian Foundation is a federally-recognized 501c3 not-for-profit organization. E-mail cambrian@sundial.net or visit www.cfhq.com.*

For fear of grounding themselves in the darkness of night, the *Virginia* pulled back to the safety of the Elizabeth River and Sewell's Point, where a battery of Confederate guns were placed. They planned to continue the battle the next day, to finish the *Minnesota* before continuing the attack on the *Roanoke* and *St. Lawrence*.

What the Confederates did not know was that the *USS Monitor* had arrived in the darkness and had taken up alongside of the *Minnesota* to protect her. Unlike the *Virginia*, which was a modified wooden ship, the *Monitor* was a specially-designed ironclad ship, a marvel of ingenuity built by John Ericsson, a Swedish-American engineer and inventor. She weighed 776 tons, was 172 feet long and 41 feet wide. Drafting 11 feet/ 4 inches and with a 12-inch freeboard, she carried a 360-degree rotating turret that housed only two 11-inch Dahlgren guns.

On the morning of March 9, the *Virginia* headed out to

continue the battle that had begun the day before. Before she could get close to the *Minnesota*, however, the *Monitor* moved up and engaged the *Virginia*. The battle lasted for approximately four hours, and at times the two ships fired upon each other at point-blank range. At one point the *Virginia* ran aground, but the *Monitor* could not finish her.

Later in the battle, the *Virginia* put a shot into the pilothouse of the *Monitor* and blinded her captain, Lieutenant John L. Worden. The *Monitor*, its captain wounded, steamed away from the battle. The Confederates believed that the *Monitor* was retreating. Lieutenant Samuel Dana Greene, the executive officer, assumed command with these instructions from the wounded captain: "Gentleman, I leave it with you. Do what you think is best. I cannot see, but do not mind me. Save the *Minnesota* if you can."

After attending to the captain, Greene turned the ship around to resume the battle. By the time the ship turned, the

*Virginia* had decided to return to Norfolk for repairs, and the Union believed that the *Virginia* was abandoning the fight. Both sides considered the battle to be a victory despite the fact that no other ships were taken or sunk and the blockade was still intact.

The irony of this battle was that the *Monitor* was not supposed to be there that day, but had she not arrived, the Confederates would have surely sunk the remaining ships and broken the blockade. Had this happened, the British and French, who were observing the battle, might have sided with the Confederates, which probably would have changed the outcome of the war.

The two ships would not meet again in battle, and in fact, neither ship would see its first birthday. On May 11, 1862, after the fall of Norfolk to the Union, the *Virginia* had no place to run. She was run ashore by her captain, Josiah Tattnall (who replaced the wounded Buchanan), and set ablaze to prevent her capture by the Union. Captain Tattnall reported to the Confederate Secretary of the Navy, Stephen R. Mallory, "The *Virginia* no longer exists."

On December 31, 1862, the *USS Monitor* sank in a storm, 16.1 miles south-southeast of Cape Hatteras, North Carolina while being towed by the *USS Rhode Island*. She was on her way to Beaufort, North Carolina to assist with the blockade there. The scene of man after man plunging to their deaths into the raging sea while trying to reach lifeboats caused a few of the crew to freeze on the top of the *Monitor's* turret in terror. Boats from the *Rhode Island* continually risked their lives evacuating the crew from the ill-fated iron-clad. The men lined the *Rhode Island's* rail to look for their ship, her lights alternately appearing and disappearing behind the monstrous waves. Finally, near one o'clock in the morning, her lights disappeared forever.

The *Monitor* was discovered in 1973 in 230 feet of water and on January 30, 1975, the site was designated as the nation's first marine sanctuary under Title III of the Marine Sanctuaries, Research and Protection Act of 1972. ①

*Information in this history comes from William C. Davis' Duel Between the First Ironclads, Louisiana State University Press, 1975.*

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