



USS MUNSEE (ATF-107) extinguishing MISSISSINEWA fires.  
Historical photos by Simon "Sid" Harris

## U.S. Navy Successfully Offloads Nearly Two Million Gallons of Oil Threatening the Ulithi Atoll



The USS MISSISSINEWA (AO-59), a 553-foot long, 25,425-ton Navy oil tanker.

Ulithi Atoll, Yap State, Federated States of Micronesia, is home to the USS MISSISSINEWA (AO-59), a sunken World War II U.S. Navy oil tanker. The MISSISSINEWA remained a silent war grave for over 50 years until it began leaking oil into the Ulithi lagoon in August 2001. Although the U.S. Navy was able to plug the oil leaks from exposed piping, the surrounding circumstances indicated the possibility of a greater release, which prompted a formal request by the Yap State Government for the U.S. Navy to offload the oil. Preparations for the offloading began in August 2002, and in February 2003, on-site offloading operations were successfully completed.

# USS MISSISSINEWA REMAINS A SILENT WAR GRAVE



USS MUNSEE extinguishing MISSISSINEWA fires.



## HISTORY OF THE MISSISSINEWA

Commissioned on May 18, 1944, the USS MISSISSINEWA (AO-59) was a 553-foot long, 25,425-ton Navy oil tanker, home to a crew of 298—twenty officers and 278 enlisted sailors. In her short career at sea, the MISSISSINEWA managed to accumulate four Battle Stars from actions surrounding Yap, Peleliu, Leyte and Okinawa.

On the morning of November 20, 1944, the MISSISSINEWA was fully loaded with various types of fuel and lubricating oil for surrounding ships and aircraft, including 440,000 gallons of highly volatile aviation gasoline. The oil tanker dropped anchor that fateful morning in the tranquil waters of Ulithi Atoll, a member of the Federated States of Micronesia, in the Western Sector in the Caroline Islands chain. Located 1,300 miles south of Tokyo, the once Japanese-occupied Ulithi is made up of a series of islands forming a well-protected lagoon covering an area of approximately 200 square miles. This made for an excellent staging area for the U.S. Navy armada of battleships,

aircraft carriers, destroyers and many other support ships. In September 1944, American troops took control and turned it into the largest Naval Base in the area. Serving as a supply and repair facility, Ulithi welcomed over 700 U.S. Pacific Fleet ships.

Just as the MISSISSINEWA dropped anchor, a “Kaiten”, or a manned torpedo version of a “Kamikaze”, was launched from a Japanese submarine; the MISSISSINEWA was its target. Extending 48-feet, and containing a 3,400-pound warhead and one pilot, the “Kaiten” penetrated the starboard side of the MISSISSINEWA, resulting in a massive explosion that instantly killed many crewmembers.

The men aboard the ship were forced over the sides into the burning oil-coated waters. Boat crews from the USS LACKAWANNA (AO-40) were ordered to pull the men out of the water, rescuing over 200 sailors while the fleet tug USS MUNSEE (ATF-107)

worked to extinguish the fires. However, the MISSISSINEWA was devastated. Overwhelmed by water and structural damage, the MISSISSINEWA and 63 of her sailors were lost. As Simon “Sid” Harris, a crew member on the MUNSEE recalled, “The stern rose, displaying the huge, twin, four-bladed screws in a final salute and then disappeared beneath the burning, oil-coated sea.” The attack on the MISSISSINEWA was the first and only documented sinking of a U.S. Navy ship by a “Kaiten” suicide manned torpedo.

For 57 years the MISSISSINEWA remained undisturbed but never forgotten. Home to many species of coral and marine life and containing just under two million gallons of Navy special fuel oil (NSFO) and marine diesel fuel, it lay upside-down at the bottom of the sea, a war grave for 50 of the 63 sailors who lost their lives.

IN HER SHORT CAREER AT SEA,  
**THE MISSISSINEWA MANAGED TO ACCUMULATE FOUR BATTLE STARS FROM ACTIONS SURROUNDING YAP, PELELIU, LEYTE AND OKINAWA.**



Local U.S. Navy Vessels attempting to put out the fire and smoke engulfing the MISSISSINEWA.



In the final moments of the sinking, a devastated USS MISSISSINEWA overturned, displaying her two screws.



The USS MISSISSINEWA, on fire after being struck by Japanese kaiten November 20, 1944.



The charred remains of the USS MISSISSINEWA prior to its sinking.

USS MUNSEE extinguishing MISSISSINEWA fires.



USS Salvor deck crew handling lines while mooring alongside the primary support barge.



Deck crew on subcontracted tug Seacor Rover preparing to deploy one of six mooring anchors.



Subcontractor deck crew on primary support barge mobilized from Singapore.

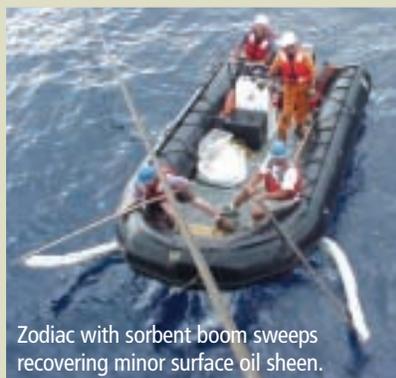


SUPSALV inflatable boats underway to job site.

## INVESTIGATING THE MISSISSINEWA WRECK SITE

In April 2001, a team of independent divers dove on the wreck site 130 feet below the surface in the Ulithi Lagoon and identified the vessel as the wreck of the USS MISSISSINEWA. The wreck, bearing an enormous crater from the explosion, lay in two separate pieces; the bow, resting on its port side, revealed an intact starboard 3-inch gun that through the years had been overwhelmed with coral. Also near the port side, visible hatches and quarters remained permanently open. The stern section of the hull lay totally inverted with the screws visible atop the wreck as they were in the final moments of the sinking. Shortly after this dive, a tropical storm shook the Atoll and oil began leaking from piping in one of the ship's cargo tanks that was open to the sea due to the explosion damage. The oil seeping from the corroded piping and then from this damaged tank was potentially threatening the waters and the more than 700 residents of Ulithi.

In August 2001, as a result of requests from the Yap State Government, the U.S. Department of State, the U.S.



Zodiac with sorbent boom sweeps recovering minor surface oil sheen.

Department of Interior, and the U.S. Coast Guard, the U.S. Navy assembled a team of experts to survey the MISSISSINEWA wreck site to determine the source of the oil and, if possible, stop the release of oil into the lagoon. The Naval Sea Systems Command (NAVSEA) Supervisor of Salvage (SUPSALV) surveyed the vessel and determined whether any discovered leaks could be patched. The leaking piping in number four starboard wing tank was discovered and repaired. However, there was evidence of corrosion around the repaired area, and the potential existed for this area, as well as others, to continue to corrode and potentially release oil in the future. Also at this time, a study conducted by the

U.S. Coast Guard and National Oceanic and Atmospheric Administration (NOAA) showed that the oil released in August had caused only minimal environmental impact on Ulithi.

In December 2001, another leak was reported. SUPSALV, GPC (SUPSALV's environmental response contractor) and the U.S. Navy Mobile Diving and Salvage Unit One (MDSU-1) were sent to the Mississinewa wreck site to investigate and, if possible, stop the leak. Another piping leak attributed to corrosion was discovered in about the same location as the previous leak and was subsequently repaired. The SUPSALV/GPC/MDSU-1 salvage team at this time also conducted a more extensive survey of the wreck.

Although not all MISSISSINEWA's cargo and fuel tanks were checked, the survey revealed that up to 2.8 million

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Navy scuba divers surfacing following survey dive.

gallons of oil could remain on board, most of it a thick, sticky product not easily removed from water surface and varying in color from very dark brown to black. The aviation fuel aboard the ship at the time of the sinking was kerosene, but much was either pumped out the afternoon prior to the attack or burned after the Japanese attack, rendering any potential threat benign.

The Government of Yap, recognizing that a serious oil spill would threaten the marine life and the residents, made a request to the U.S. Navy through the Department of State for the removal of the oil. The Navy concurred and began preparing for a more aggressive approach for permanently preventing any future oil releases from the MISSISSINEWA. Given the deteriorating piping, existing hull damage and amount of oil still aboard the ship, there was the possibility of additional oil spills, potentially impacting the 773 people living on the islands who rely nearly entirely on the fishing industry to sustain their economy and way of living.

### CONSIDERING OPERATIONS FOR DEALING WITH REMAINING OIL

The Navy prepared an Environmental Assessment (EA) that considered a number of options for dealing with the oil on the MISSISSINEWA. The first was a “no action alternative,” which consisted of leaving the oil aboard the MISSISSINEWA. Another option



USS MUNSEE (ATF-107).

## SIMON “SID” HARRIS



**S**imon “Sid” Harris was a sailor aboard the USS MUNSEE (ATF-107) the morning of the attack on the USS MISSISSINEWA (AO-59). The MUNSEE, located two miles away, sounded its alarms only minutes after the attack and was the first tug to reach the tanker

through the thick black smoke. Immediately, the crew of the MUNSEE began extinguishing the fires attempting to contain the damage. During the chaos, Harris, using his own camera, was able to snap 37 photos of the smoldering tanker and its final moments. Now in his mid-eighties, Harris is one of few survivors that remain from the MUNSEE. His photos serve as an everlasting reminder of the heroes and valiant efforts to save the MISSISSINEWA.



Sid Harris aboard the USS MUNSEE.



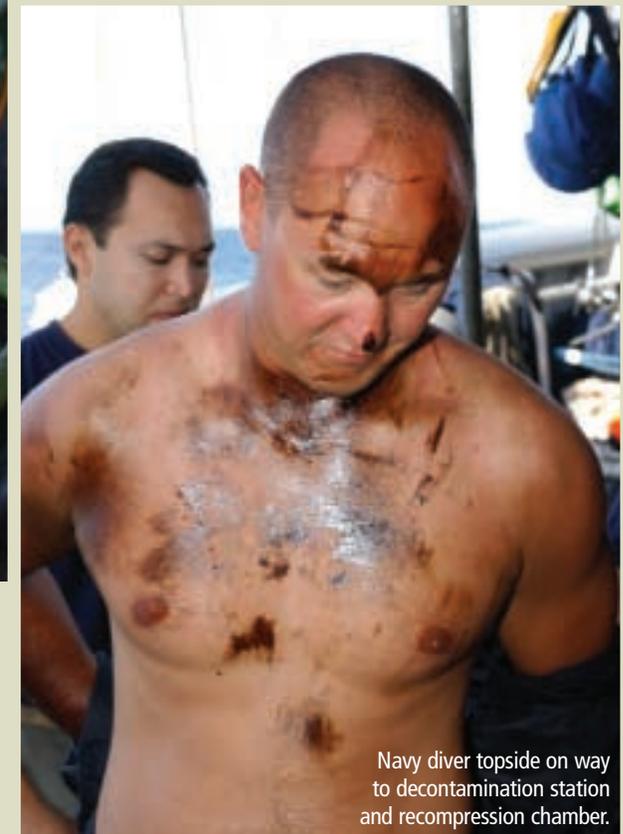
Navy Mk 21 hardhat with helmet-mounted video camera and light—following dive in #4 starboard tank. (Mk 21 is the Mark 21 Mod 1 Underwater Breathing Apparatus diving system.)

was to continue patching the hull and piping as leaks occurred. According to the EA from May 2002, “Once a leak is reported, it takes at least 11 days to mobilize resources to the site, at an estimated cost of \$500,000.” It would be a matter of weeks before the leak could be sealed and a considerable amount of oil might be released in that time; therefore, this option was not pursued. Due to the deteriorating condition of the ship’s hull and exposed fuel piping systems, however, the Navy assessed other alternatives for dealing with the oil remaining onboard the ship to ensure there would be no future releases of oil into the Ulithi lagoon.

Another option contemplated, to ensure no future release of oil, was solidification. This process involves mixing a large amount of solidifier with

the pre-existing large quantity of oil. This option was later considered impractical, not only due to the great volume of solidifier required, and the difficulty of mixing the oil and solidifier in MISSISSINEWA tanks, but also due to the questionable long-term stability of the solidified oil.

A final option considered was total vessel removal. The MISSISSINEWA is one of many sunken ships, including the USS ARIZONA located in Pearl Harbor, which remains an unscathed war grave to the sailors who lost their lives during the attack. Raising the MISSISSINEWA could break up ship compartments where human remains now lie undisturbed. The potential for worse environmental impacts from



Navy diver topside on way to decontamination station and recompression chamber.

raising an unstable wreck in addition to disturbing a war grave made vessel removal an unfeasible alternative.

The Navy ultimately decided to remove the oil from the wreck as it lay at the bottom of the lagoon. Divers would use a series of tools and techniques, including hot tapping into the tanks, to pump the oil onto a barge moored directly above the wreck.

### THE OIL OFFLOAD OPERATION

The Chief of Naval Operations (CNO) assigned SUPSALV the overall responsibility for planning and executing the oil offload operation and directed

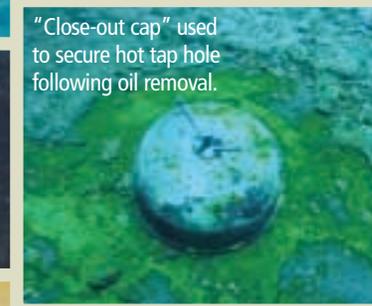
THE MISSISSINEWA IS ONE OF  
MANY SUNKEN SHIPS WHICH  
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TO THE SAILORS WHO LOST THEIR LIVES DURING THE ATTACK.



Navy divers in Mk 21 surface-supplied air rigs preparing to drill, tap, and bolt hot tap flange to hull.



Navy diver rigging oil discharge hose on MISSISSINEWA's inverted hull.



"Close-out cap" used to secure hot tap hole following oil removal.



Navy Mk 21 divers on divers stage preparing to descend from Salvor to MISSISSINEWA.



Navy Mk 21 diver suited out topside on Salvor.



Navy divers preparing to bolt hot tap flange on MISSISSINEWA hull.



One of four 10' x 50' inflatable fenders on primary support barge prior to deployment between nested vessels.



Two hot tap devices on deck—without cutter heads.

A 23' zodiac was used to transfer personnel between vessels as required.



Hot tap and pumping equipment being transferred from the primary support barge to USS Salvor alongside.



Standby oil spill response equipment staged on the aft deck of the Singapore-based tug Seacor Rover.



Explosive Ordnance Disposal Mobile Unit Five (EODMU-5) in Guam were directed to augment SALVOR divers and diving equipment.

SUPSALV provided an On-Scene Salvage Supervisor and again mobilized GPC to assist in the oil offload. GPC mobilized specialized hot tapping, pumping and related support systems from SUPSALV Emergency Ship Salvage Material (ESSM) bases in Williamsburg, Virginia, Hawaii, and Singapore, subcontracted for four support vessels from Singapore, and provided

a Project Manager and skilled oil offloading team. Subcontracted support vessels were a primary support barge, an oil receiving barge, and two barge-towing vessels.

The climate and water conditions in Ulithi, as well as the position of the MISSISSINEWA on the sea floor, were just about perfect for the offloading procedure. Although the divers were prepared to conduct the offload in any weather condition, the operation took place during the tropical storm off-season, dramatically easing the efforts. The state of the wreck offered excellent options for the recovery. The hulls

**DUE TO THE WARM WATER TEMPERATURES, THE OIL WAS NOT AS THICK AS IT WOULD BE UNDER COOLER TEMPERATURES, ELIMINATING ANY NEED TO HEAT THE OIL.**



Shy Ulithi Islander.



Local housing on one of the four inhabited islands surrounding Ulithi Atoll lagoon.



Local island boys.

good condition and inverted position provided divers with easy access to 22 tanks that possibly contained oil. Additionally, the shallow waters made for excellent underwater visibility and extended diver bottom times. Ulithi's mild water temperature was also advantageous to the effort. Often during these types of oil removal operations, the oil needs to first be heated, thinning the oil to ease the pumping process. Due to the warm water temperatures, the oil was not as thick as it would be under cooler temperatures, eliminating any need to heat the oil. Present during the operation was Bill Walker the NAVSEA on-scene salvage supervisor. Walker, extremely pleased with the success of the operation, noted that "because the operation went so smoothly, we were able to retrieve the oil in only four weeks, not the scheduled six."



Local Ulithi Island dancers at MISSISSINEWA Memorial dedication ceremony.



The Commanding Officer of USS Salvor (center) and other crewmembers during MISSISSINEWA Memorial dedication ceremony.



## HOT TAPPING

According to the operations plan, “the MISSISSINEWA offloading concept of operations involves the use of divers to tap into oil cargo and fuel tanks on the inverted hull of MISSISSINEWA and to rig submersible pumps and hoses to allow pumping MISSISSINEWA’s oil to a barge on the surface.” Navy divers descended from the SALVOR and attached hot tap devices to the tank locations on the hull. Small pumps were then positioned over the hot tap as hoses were connected to the barge. The SALVOR, positioned alongside the primary support barge, coordinated diving operations with SUPSALV/GPC pumping operations.

The hot tap operation involved cutting 3.5-inch holes in the hull of the ship at top locations on the tanks, using a rotating cutter device. Once this hole was cut, a valve over the hole was secured and a hose attached to the submerged pump replaces the cutter. The valve was then opened,

and the oil pumped out of the tank. The pumping continued until water was detected.

The hot tapping began with the tanks containing the greatest volume of oil and involved a series of ‘pumping and settling’ cycles to strip the tanks. The oil was pumped from the tanks at a rate of up to 450 gallons per minute. Once water was detected at a sampling port, initial high volume pumping was replaced by a series of alternating settling and low volume “stripping” pump sequences to ensure removal of all accessible oil. After all the accessible oil had been removed, the divers then removed the valves and permanently sealed the access holes.

The diving team installed 20 hot taps along the hull. In addition to accessing oil through the hull plating, they were also able to cut diver access through the hull to two internal tanks: one in the stern section and the other in the separated bow

section, to gain access to more oil. Upon completion of the offload operation, it was estimated that approximately 1.95 million gallons of oil was pumped from 21 tanks, the engine room, pump room and previously leaking piping.

## SAFETY PRECAUTIONS TO PROTECT THE DIVERS AND THE ENVIRONMENT

Important safety precautions were taken to protect both the divers and the environment during the oil offload. Safety briefings were conducted every day to address that day’s procedures. In anticipation of minor oil releases, GPC maintained on-site spill response equipment. GPC also conducted visual surveillance around the area looking for a sheen that might appear consistent with what would appear if oil began leaking to the surface.

AT THE COMPLETION OF THE OFFLOAD,  
**IT WAS ESTIMATED THAT LESS THAN 14,000  
GALLONS OF OIL REMAINED ABOARD THE SHIP  
IN INACCESSIBLE LOCATIONS.**



MISSISSINEWA Memorial plaque with the names of lost Mississinewa crewmembers.

MISSISSINEWA Memorial built by USS Salvor crew.



The Navy's spill response plan included the use of chemical dispersant. Enough chemical dispersant was available to deal with a spill of up to 6,000 gallons, the greatest potential spill anticipated in the EA. The dispersant was to be used only if the oil was outside of containment boom control and if sensitive resources were likely to be impacted. In addition to these measures, all response vessels implemented mooring systems designed to minimize any potential damage to the coral in the areas around the wreck. It is estimated that less than five gallons of oil was released during the offloading, causing no environmental impacts.

Several endangered species exist in the Ulithi area, including two species of sea turtles and three species of marine mammals. Over 1,000 turtles inhabit the region throughout the year. The green sea turtle listed as endangered worldwide, and the hawksbill sea turtle listed as critically endangered worldwide are present throughout the Pacific Ocean area and the Yap State. Although it is thought that sperm whales, pilot whales and bottlenose dolphins are potential dwellers in the Atoll, no extensive research has been done in this region on these species.

## MEMORIAL SERVICE AND SUCCESSFUL MISSISSINEWA OIL OFFLOAD

On February 10, 2003, in the midst of the operation, the crew and residents of Ulithi held a memorial aboard the SALVOR in remembrance of the men who lost their lives aboard the MISSISSINEWA. That following week a permanent memorial was constructed 2 1/2 miles from the wreck on the unoccupied island of Mangejang, serving as an everlasting tribute to the valiant sailors of the USS MISSISSINEWA.

At the completion of the offload, which cost approximately \$4.5M, it was estimated that less than 14,000 gallons of oil remained aboard the ship in inaccessible locations in tanks and in fuel piping systems. The ship currently contains an estimated 7,000 gallons as clingage in the tanks, 6,000 gallons in piping systems and about 1,000 gallons in other inaccessible spaces. Walker said, "I am pleased with the Navy's success in this effort, and confident that all significant volumes of oil have been removed. The MISSISSINEWA no longer poses a threat to the people or environment of Ulithi." The ultimate outcome of the MISSISSINEWA oil offload is the elimination of the threat of future oil releases potentially affecting

the fauna and flora of the surrounding islands, and, more importantly, the livelihood of Ulithi's inhabitants in this vibrant, sparkling Pacific ecosystem. 🚢

*Note: Katie Ladowicz, former intern with the Chief of Naval Operations, Environmental Readiness Division, made significant contributions to this article.*

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