NPS Form 10-900
(Oct. 1990)

OMB No. 10024-0018

United States Department of the Interior
National Park Service

National Register of Historic Places Registration Form

This form is for use in nominating or requesting determinations for individual properties and districts. See instructions in *How to Complete the National Register of Historic Places Registration Form* (National Register Bulletin 16A). Complete each item by marking "x" in the appropriate box or by entering the information requested. If an item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, architectural classification, materials, and areas of significance, enter only categories and subcategories from the instructions. Place additional entries and narrative items on continuation sheets (NPS Form 10-900a). Use a typewriter, word processor, or computer, to complete all items.

1. Name of Property

historic name *USS Razorback* (SS-394)

other names/site number *TCG Murat Reis* (S-336), Site #PU8144

2. Location

street & number North bank of the Arkansas River in the vicinity of the I-30 Bridge ☐ not for publication

city or town North Little Rock ☐ vicinity

state Arkansas code AR county Pulaski code 119 zip code 72114

3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act, as amended, I hereby certify that this ☒ nomination ☐ request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set for in 36 CFR Part 60. In my opinion, the property ☒ meets ☐ does not meet the National Register criteria. I recommend that this property be considered significant ☒ nationally ☐ statewide ☐ locally. (See continuation sheet for additional comments.)

Cathie Matthews 10/26/04

Signature of certifying official/Title Date

Arkansas Historic Preservation Program

State or Federal agency and bureau

In my opinion, the property ☐ meets ☐ does not meet the National Register criteria. (☐ See Continuation sheet for additional comments.)

Signature of certifying official/Title Date

State or Federal agency and bureau

4. National Park Service Certification

I hereby certify that the property is:

Signature of the Keeper Date of Action

- ☐ entered in the National Register. ☐ See continuation sheet
- ☐ determined eligible for the National Register. ☐ See continuation sheet
- ☐ determined not eligible for the National Register.
- ☐ removed from the National Register.
- ☐ other, (explain:) _____

5. Classification

Ownership of Property
(Check as many boxes as apply)

- ☐ private
- ☒ public-local
- ☐ public-State
- ☐ public-Federal

Category of Property
(Check only one box)

- ☐ building(s)
- ☐ district
- ☐ site
- ☒ structure
- ☐ object

Number of Resources within Property
(Do not include previously listed resources in count.)

Contributing	Noncontributing	
		buildings
		sites
1		structures
		objects
1		Total

Name of related multiple property listing
(Enter "N/A" if property is not part of a multiple property listing.)

N/A

Number of Contributing resources previously listed in the National Register

6. Function or Use

Historic Functions
(Enter categories from instructions)

DEFENSE/naval facility/submarine

Current Functions
(Enter categories from instructions)

OTHER/museum

7. Description

Architectural Classification
(Enter categories from instructions)

N/A

Materials
(Enter categories from instructions)

foundation N/A
walls N/A
roof N/A
other STEEL

Narrative Description
(Describe the historic and current condition of the property on one or more continuation sheets.)

8. Statement of Significance

Applicable National Register Criteria
(Mark "x" in one or more boxes for the criteria qualifying the property for National Register listing.)

- ☒ **A** Property is associated with events that have made a significant contribution to the broad patterns of our history.
- ☐ **B** Property is associated with the lives of persons significant in our past.
- ☒ **C** Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.
- ☐ **D** Property has yielded, or is likely to yield, information important in prehistory or history.

Criteria Considerations
(Mark "x" in all the boxes that apply.)
Property is:

- ☐ **A** owned by a religious institution or used for religious purposes.
- ☐ **B** removed from its original location.
- ☐ **C**. birthplace or grave of a historical figure of outstanding importance.
- ☐ **D** a cemetery.
- ☐ **E** a reconstructed building, object, or structure.
- ☐ **F** a commemorative property
- ☐ **G** less than 50 years of age or achieved significance within the past 50 years.

Levels of Significance (local, state, national)
National

Areas of Significance (Enter categories from instructions)
Engineering
Maritime History
Military

Period of Significance
1943-1955

Significant Dates
1943-1955

Significant Person (Complete if Criterion B is marked)

Cultural Affiliation (Complete if Criterion D is marked)

Architect/Builder
Portsmouth Naval Shipyard, Builder

Narrative Statement of Significance
(Explain the significance of the property on one or more continuation sheets.)

9. Major Bibliographical References

Bibliography
(Cite the books, articles, and other sources used in preparing this form on one or more continuation sheets.)

Previous documentation on file (NPS):

- ☐ preliminary determination of individual listing (36 CFR 67) has been requested
- ☐ previously listed in the National Register
- ☐ Previously determined eligible by the National Register
- ☐ designated a National Historic Landmark
- ☐ recorded by Historic American Buildings Survey #
- ☐ recorded by Historic American Engineering Record #

Primary location of additional data:

- ☒ State Historic Preservation Office
- ☐ Other State Agency
- ☐ Federal Agency
- ☒ Local Government
- ☐ University
- ☐ Other

Name of repository: City of North Little Rock

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In August 1952 the *USS Razorback* was briefly decommissioned and returned to the Portsmouth Naval Shipyard in order to participate in the Greater Underwater Propulsion Power Program (also known as "GUPPY"). The Guppy program was initiated by the Navy after World War II in order to improve the submerged speed, maneuverability, and endurance of their submarines. Specifically, the *Razorback* participated in the Guppy IIA program, which ran from 1952 through 1954. As with the Guppy II program, the Guppy IIA program streamlined the submarine, installed a new sail, a guppy bow, and new motors where they were necessary. The Guppy IIA program, however, went further in that it replaced one forward engine with air-conditioning plants and refrigeration units. The submarine's chill box and freeze boxes were relocated to the forward end of the after battery located under the galley. In addition, submarines that underwent the Guppy IIA modifications had the sonar moved to available space in the forward end of the pump room and some boats had the high-pressure air compressors moved to the lower level of the forward engine room. The only exterior difference between submarines that underwent the Guppy II and Guppy IIA modifications is that the Guppy IIA boats only had three diesel exhaust outlets instead of four.

In all, thirteen Balao class and four Tench class submarines had the Guppy IIA modifications. The Guppy IIA modifications were completed on the *Razorback* mainly in 1953 and she was recommissioned in January 1954.

Exterior

The exterior of the *Razorback* is covered in 7/8" thick steel plating, which forms the outer hull of the vessel. The general shape of the *Razorback* is roughly cylindrical with tapered forward and aft ends. The top of the vessel also has a steel and wood superstructure that creates a flat area to walk on. The superstructure also provides access to the *Razorback's* hatches and the ladders that scale the conning tower.

Along both sides of the vessel, in between the top of the hull and the bottom of the superstructure, are a series of perforations that allow water to drain out of the space underneath the superstructure. In addition, the exhaust ports for the submarine's three diesel engines are located near the top of the hull towards the aft end of the vessel.

The most prominent feature of the submarine's exterior is the conning tower slightly towards the forward end of the vessel. The tower features a rounded forward end and a tapered rear. The front features a series of five small rectangular windows near the top of the tower, and the number "394" is painted in white towards the bottom front of the tower. (During the time that the vessel served in the Turkish Navy as the *TCG Murat Reis*, "S336" was painted in white towards the center of the conning tower's sides.) The periscopes, if deployed, extend out of the top of the tower.

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Interior

The interior of the *Razorback* contains eight major areas, which are, proceeding from the front of the submarine to the rear: Forward Torpedo Room, Officer's Area with the Forward Battery Area below, Control Room with the Sonar Room below and conning tower above, the Crew's Galley and Bathing/Bunk Area with the After Battery Area below, the Forward Engine Room, the After Engine Room, the Maneuvering Room, and the Aft Torpedo Room. Although each of these areas is mainly devoted to one purpose, they also may be used for other secondary functions, such as the location of extra bunks.

The forward torpedo room is the first area seen in the front of the vessel, and it contains the six forward torpedo tubes, racks for torpedo storage, and a few bunks. The space still contains the original tubes, storage racks, and bunks, and reflects its historic appearance.

Proceeding towards the aft of the vessel, the next area encountered is the officers' area. This area contains the officers' mess hall, galley, and quarters. As with the forward torpedo room, the officers' area reflects its historic appearance. Below the officers' area is the forward battery room. The batteries, however, were removed just prior to the *Razorback's* departure from Turkey in 2001.

The next area seen when proceeding aft in the *Razorback* is the control room. The control room contains the main controls of the submarine. Again, this part of the vessel reflects its historic appearance. Below the control room is the sonar room, which allowed the *Razorback's* crew to determine the distance between their vessel and other vessels through sending sound waves through the water. (Sonar stands for **SO**und **N**avigation **A**nd **R**anging.) The sonar room reflects the Guppy IIA modifications done to the submarine in 1952-1953. A ladder in the control room also provides access to the conning tower, where the submarine's two periscopes are located.

The next area of the vessel proceeding aft is the crew's galley, mess hall, and quarters. The crew's quarters consists of four tiers of metal bunks. Below the crew's area is the aft battery area. Again, the batteries in this area were removed just prior to the *Razorback's* departure from Turkey in 2001.

Proceeding aft, the next area is the forward engine room. The forward engine room currently reflects the Guppy IIA modifications done to the submarine in 1952-1953, which replaced one forward engine with air-conditioning plants and refrigeration units. The aft engine room, however, still retains both engines.

The next area proceeding aft in the vessel is the maneuvering room where the electric motor controls are located. The electric motors, which are used to power the boat while submerged, were powered by the batteries that were contained in spaces below the deck of the officers' and crew's areas.

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The aft torpedo room is the final area of the submarine proceeding aft. This torpedo room contains four torpedo tubes, rather than the six tubes found in the forward torpedo room. Like the forward torpedo room, it also contains racks for torpedo storage, and a few bunks. The space still contains the original tubes, storage racks, and bunks, and reflects its historic appearance.

Integrity

The *USS Razorback* possesses very strong integrity. The submarine is still operational and many of the systems were used in aiding its voyage from Turkey to North Little Rock in 2004. Since the *Razorback* was built, parts of the submarine have been replaced and repaired. However, this is a normal practice for naval vessels as parts wear out. In addition, although the *Razorback* was modified in the early 1950s with the Guppy IIA upgrades, those upgrades are more than fifty years old, and contribute to the vessel's significance by illustrating the evolution of submarine design over time. The *USS Razorback* currently resides in the Arkansas River in downtown North Little Rock. Although it did not historically operate on the Arkansas River, the *Razorback* did operate in other U.S. rivers, specifically the Piscataqua River adjacent to the Portsmouth Naval Shipyard and the Thames River adjacent to the Naval Submarine Base in New London, Connecticut. As a result, its current setting still reflects the *Razorback's* period of significance while it was in operation in the U.S. Navy.

The transfer of the *USS Razorback* directly from the Turkish Navy to the City of North Little Rock, without having it prepared for a proposed scrapping, has also allowed the vessel to retain remarkable integrity. The *Razorback* retains items that other submarines that are now museums likely do not, such as her complete sonar system and many operating manuals, some in English and some in Turkish. To date, thirty boxes and numerous bags of items have been removed for cataloguing, including a framed photograph of Kemal Atatürk, a pair of shoes found in an officer's quarters, and a set of photograph negatives found in the captain's desk showing the ceremony that transferred the *Razorback* to Turkey in 1970. Overall, the *Razorback* is a uniquely intact example of a Balao class submarine with Guppy IIA modifications, and is able to convey a very complete picture of what life on a submarine was like from World War II to the beginnings of the twenty-first century.

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SUMMARY

The *USS Razorback* is being nominated to the National Register of Historic Places under **Criterion C** with **national significance** as an excellent example of a Balao class submarine with Guppy IIA modifications. Of the thirteen Balao class submarines that underwent Guppy IIA modifications between 1952 and 1954, the *USS Razorback* is the last remaining example in the United States, and one of the few remaining examples in the world. The *USS Razorback* is also being nominated to the National Register under **Criterion A** for her role in U.S. maritime and military history. Having served in the U.S. and Turkish navies from her commissioning in April 1944 until she was decommissioned in August 2001, the *USS Razorback* was the longest-serving submarine in the world at the time of her decommissioning. In addition, the *USS Razorback* is the last operational submarine that was present in Tokyo Bay on September 2, 1945, to take part in the formal surrender of Japan, which officially ended World War II. During its distinguished U.S. military career, the *USS Razorback* earned five battle stars for her WW II service and four stars for her service in Vietnam.

ELABORATION

Although the notions and possibilities of underwater travel were thought of in ancient times by people such as Herodotus, Aristotle, and Pliny the Elder, the first apparent successful submarine voyage did not occur until 1620 with a craft built by Cornelius Drebbel (or Van Drebel, according to some sources).[1] Drebbel used designs drawn in 1578 by William Bourne, a British mathematician and naval writer, and constructed a vessel with a wooden frame and a watertight hull made of greased leather. Propulsion was provided for with twelve oars that extended through the sides, and air was supplied via tubes that were supported on the water's surface by floats.[2] One of the first passengers to ride on Drebbel's vessel was King James I of England who was elated about his voyage to a depth of 15 feet.[3]

By 1727 there were fourteen patents in England alone that had been issued for submarines, including one for a forerunner of the modern ballast tank. It employed goatskin bags that were attached to the hull and also attached to an aperture in the submarine's bottom. As the vessel descended below the water's surface, the bags would take on water. When the vessel was ready to surface, a twisting rod would force the water from the skins.[4]

It would not be until 1775 that the United States would become involved in submarine construction when David Bushnell built a vessel named the *Turtle*. The purpose of the *Turtle* was to get rid of the British

[1] Charles Panati. *Panati's Browser's Book of Beginnings*. Boston: Houghton Mifflin Co., 1984, pp. 321-322.
[2] Commander C. W. Rush, W. C. Chambliss, and H. J. Gimpel. *The Complete Book of Submarines*. Cleveland: The World Publishing Company, 1958, p. 12.
[3] Panati, p.322.
[4] *Ibid.*

blockade of New York harbor.[5] While a student at Yale University, Bushnell became interested in and solved the problem of exploding gunpowder underwater. If gunpowder could be exploded underwater, particularly under a British ship, then the problem of the British Blockade of New York could be potentially solved. As a result, he designed and built the *Turtle* with an oak hull bound with iron bands, and the submarine measured 7½ feet long and 6 feet tall.[6] Although most of the cost of construction was financed by Bushnell, she was also partially funded by the State of Connecticut.[7]

On September 6, 1776, the *Turtle*, piloted by Sgt. Ezra Lee, set out to attack the *H.M.S. Eagle*. Although Lee was not able to fasten the mine to the ship's hull, he released the mine as he withdrew. The subsequent explosion did not damage any of the British ships, but it did frighten them enough to move their ships downstream. Bushnell would try two more attacks later in September, and on October 6 the boat carrying the *Turtle* was sunk. Although the submarine was salvaged, she apparently did not see any more action.[8] Nevertheless, the era of the American submarine was born.

Even though the *Turtle* proved that the use of submarines could be a valuable asset to the Navy, it was not until the early twentieth century that the Navy embraced the idea by announcing specifications for a proposed submarine and inviting bids. The person who would eventually be selected by the Navy was John Holland the head of the Holland Torpedo Boat Company. Holland had been experimenting with submarines for almost twenty-five years, and he thought of a submarine that would go beneath the water's surface using engine power and neutral buoyancy.[9]

Although Holland's company won the Navy's contract for their first submarine, he believed that the Navy's specifications would not result in a satisfactory vessel, and he would be proved correct. The Navy required that the vessel be propelled by a steam engine on the surface and electric motors while submerged. However, the length of time required to extinguish the fire and vent the steam from the boilers of the steam engine prior to diving was unacceptable. In addition, the boat's interior was excruciatingly hot underwater from the residual heat.[10]

Since Holland's first submarine for the Navy proved unacceptable, it was scrapped and another vessel, this time using a gasoline engine for surface propulsion, was constructed. A gasoline engine could be shut down instantly, and transfer to electric propulsion could be accomplished with the flick of a switch. The second

[5] Norman Friedman. *U.S. Submarines Through 1945: An Illustrated Design History*. Annapolis: Naval Institute Press, 1995, p. 11.
[6] Rush, et al., p. 13.
[7] Friedman, p. 11.
[8] Friedman, pp. 11-12.
[9] Rush, et al., p. 23.
[10] Rush, et al., pp. 23-25.

vessel was much better, and was accepted by the Navy on April 11, 1900. In fact, the vessel was named the *USS Holland* in honor of John Holland, and Holland's company, which eventually became the Electric Boat Division of General Dynamics Corporation, has been the Navy's consistent civilian partner in submarine construction.[11]

After World War I, the Navy began to invest in earnest in submarine development, and their first long-range vessel, the *Argonaut*, was built in 1928. She had a length of 381 feet and a displacement of 2,710 tons, and was the largest non-nuclear submarine ever deployed by the Navy.[12] The *Argonaut* was built specifically as a minelayer, and she was armed with four forward torpedo tubes and could carry sixty mines. The design of the *Argonaut* was the forerunner of the Gato and Balao classes, and employed design features, such as a horizontal cylindrical conning tower, that would become standard on future submarines.[13]

The Gato class represented the state of the art submarine at the beginning of World War II. They were based on the previous Tambor class and incorporated all of the experience gained from the previous classes as well as experience gained during the war. The Gato class became the standard design built during the war, and it was also well-suited to mass production given the fact that it employed a fully welded design. Most of the modifications were internal, and included full air-conditioning and crew comforts that were necessary for long-range Pacific patrols.[14]

Like the Gato class, the Balao class, which included the *USS Razorback*, was an evolutionary submarine designed that was based on previous classes, specifically the Gato class. (The term "Balao" is another name for the Halfbeak, a slender marine fish with a protruding lower jaw.) Although many of the improvements in the Balao class were internal, the most significant improvement was the use of higher strength steel (7/8" thick rather than 9/16" thick), which allowed a test depth of 400 feet rather than the Gato class's 300 feet.[15]

The construction of the *USS Razorback* began on September 9, 1943, with the laying of the keel at the Portsmouth Naval Shipyard in Kittery, Maine.[16] (The term "Razorback" is another name for the Rorqual family of whales, which are characterized by throat grooves that extend from the throat to the flippers.) The Portsmouth Naval Shipyard (PNS), which was established in June 1800, is the oldest naval shipyard continuously operated by the U.S. government. The PNS's role in submarine construction began in World

[11] Rush, et al., p. 25.
[12] Panati, pp.322-323.
[13] Panati, p. 323, and Friedman, p. 178.
[14] Anthony J. Watts. *Allied Submarines*. New York: Arco Publishing Company, Inc., 1977, p. 56.
[15] Friedman, p. 208, and Information on Balao class submarines found at: http://encyclopedia.thefreedictionary.com/Balao%20class%20submarine.
[16] Information on the *USS Razorback* (SS-394) found at: http://www.subnet.com/fleet/ss394.htm.

War I and greatly increased during World War II and the period of the *Razorback's* construction. A total of seventy submarines were built at PNS during WW II and, remarkably, four of them were launched on the same day. PNS remained the Navy's center for the design and development of submarines after WW II up into the nuclear age. The last submarine built in a public shipyard was the nuclear-powered *USS Sand Lance*, launched at PNS in 1969.[17]

By early 1944, the construction of the *Razorback* was far enough along that she was launched on January 27. Her sponsor was Mrs. Henry F.D. Davis, wife of the shipyard's industrial manager. Final construction details were then completed and the *Razorback* was commissioned on April 3, 1944, under the command of Lieutenant Commander Albert M. Bontier. (Bontier would later be killed in action on October 3, 1944, off Morotai Island in Indonesia in the loss of the submarine *USS Seawolf*.)[18]

Once the *Razorback* was commissioned, she underwent shakedown trials off of the New England coast before sailing to Pearl Harbor. Her first war patrol began on August 25 when she sailed west from Pearl Harbor to be a member of an offensive group conducting patrols east of Luzon in the Philippines in support of the mid-September landings on Palau. After the group only sighted enemy antisubmarine planes, the *Razorback* sailed northeastward, arriving at Midway on October 19, 1944.[19]

After a refit period in Midway, the *Razorback* departed on her second war patrol on November 15, 1944, accompanied by the *USS Trepang* (SS-412) and the *USS Segundo* (SS-398). The group of submarines operated in the Luzon Straits where the *Razorback* damaged a 6,933-ton freighter on December 6 and sank an 820-ton destroyer and damaged another freighter on December 30. She returned to Guam for refit, arriving on January 5, 1945.[20]

The *Razorback's* third war patrol began on February 1, 1945, when she set out for the East China Sea, accompanied by the *Segundo* and the *USS Sea Cat* (SS-399). In three separate surface gun actions she sank four wooden ships. After dropping three Japanese prisoners off at Guam, she proceeded to Pearl Harbor where she ended her patrol on March 26, 1945.[21]

On May 7, 1945, the *Razorback* headed west from Pearl Harbor to the Nanpo Shoto and Tokyo Bay areas where she was assigned to lifeguard duty for planes on patrols in the vicinity. While on duty she rescued four B-29 pilots and a fighter pilot before traveling to Midway for refit, arriving there on June 27.[22]

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[17] Information on Portsmouth Naval Shipyard found at: http://www.ports.navy.mil/history.htm.
[18] Information on the *USS Razorback* (SS-394) found at: http://www.subnet.com/fleet/ss394.htm.
[19] *Ibid.*
[20] *Ibid.*
[21] *Ibid.*
[22] *Ibid.*

The *Razorback's* last World War II patrol, and by far her most illustrious, began on July 22, 1945. She left Midway for patrols in the Russian Sea of Okhotsk, west of the Kamchatka Peninsula, where she sank six wooden cargo sea trucks and damaged two additional ones in a surface gun action. The rest of her patrol in the Kamchatka Peninsula area was spent performing lifeguard services off of Paramushiro Island for Alaska-based planes. However, in August 1945, the *Razorback* sailed south and on August 31 she entered Tokyo Harbor with eleven other submarines to take part in the formal surrender of Japan, which marked the official end of WW II.[23] After the surrender on September 2, she departed Tokyo Bay the following day to head for home, arriving in Pearl Harbor on September 11, and ultimately arriving in San Diego on September 20.[24]

Even after World War II was over, the *Razorback* remained active with the Pacific Fleet. In early 1948 and again in late 1949, she participated in patrols off of Japan and China. However, by 1952 it was time to update the *Razorback* and convert her to a Guppy IIA-type submarine.[25]

In August 1952 the *USS Razorback* was briefly decommissioned and returned to the Portsmouth Naval Shipyard in order to participate in the Greater Underwater Propulsion Power Program (also known as "GUPPY").[26] The Guppy program was initiated by the Navy after World War II in order to improve the submerged speed, maneuverability, and endurance of their submarines. Specifically, the *Razorback* participated in the Guppy IIA program, which ran from 1952 through 1954. As with the Guppy II program, the Guppy IIA program streamlined the submarine, installed a new sail, a guppy bow, and new motors where they were necessary. The Guppy IIA program, however, went further in that it replaced one forward engine with air-conditioning plants and refrigeration units. The submarine's chill box and freeze boxes were relocated to the forward end of the after battery located under the galley. In addition, submarines that underwent the Guppy IIA modifications had the sonar moved to available space in the forward end of the pump room and some boats had the high-pressure air compressors moved to the lower level of the forward engine room. The only exterior difference between submarines that underwent the Guppy II and Guppy IIA modifications is that the Guppy IIA boats only had three diesel exhaust outlets instead of four.[27]

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[23] Of the twelve submarines that were present in Tokyo Bay at the surrender, the *Razorback* is the only surviving operational submarine, and one of two total survivors. The other survivor, the *USS Cavalla* (SS-244) was opened as a museum in Galveston, Texas, in 1971. Information taken from: Jake Sandlin. "Navy vets re-enlist to escort sub home," *Arkansas Democrat-Gazette* 29 August 2004, pp. 1B, 7B.

[24] *Ibid.*

[25] *Ibid.*

[26] *Ibid.*

[27] Information on Guppy IIA conversions found at: http://encyclopedia.thefreedictionary.com/GUPPY%20IIA.

In all, thirteen Balao class and four Tench class submarines had the Guppy IIA modifications.[28] The Guppy IIA modifications were completed on the *Razorback* mainly in 1953 and she was recommissioned in January 1954. (Today, the *USS Razorback* is the last remaining example in the United States, and one of the few remaining examples in the world.[29]) After being recommissioned, she reported to SubRon 10 (Submarine Squadron 10) at New London, Connecticut, for shakedown and training.[30]

Once her shakedown and training exercises were completed in early 1954, the *Razorback* was transferred to the West Coast where she became a member of SubRon3 (Submarine Squadron 3) based in San Diego on May 24, 1954. For the rest of 1954 and 1955, she was involved in providing antisubmarine training services for local surface and air units. In 1956 her range was extended north to Canada.[31]

On June 24, 1957, the *Razorback* returned to duty in the Far East on her first deployment to that part of the world since the 1940s. She was regularly deployed as part of the 7th Fleet up into the 1960s and she sailed into the South China Sea in 1965, and earned her first Vietnam Service Medal during the deployment. She finished her deployment in 1966 and returned to San Diego on February 1. However, she left again for the western Pacific on December 29, 1966, and returned on July 3, 1967. Her third deployment to the Pacific lasted from August 6, 1968, until February 1969.[32]

During the remainder of 1969 and into January 1970, the *Razorback* operated on the West Coast, based in San Diego, California. However, on January 30, 1970, she left on her final deployment, again to the western Pacific, which lasted until August 7. On November 30, 1970, the *Razorback* was decommissioned at the Hunter's Point Naval Shipyard. At the same time that she was struck from the Navy List, the *Razorback* was transferred to the Turkish Navy and recommissioned as the *TCG Murat Reis* (S-336).[33] The submarine was named after Murat Reis, a famous admiral in the sixteenth-century Ottoman Navy who was best known for his work in the Indian seas in 1552 and 1553.[34]

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[28] Information on Guppy IIA submarines found at: http://guppysubmarinetribute.homestead.com/Guppy2A.html.

[29] Of the thirteen submarines, the *USS Diodon* (SS-349), *USS Jallao* (SS-368), *USS Menhaden* (SS-377), *USS Bang* (SS-385), *USS Ronquil* (SS-396), and the *USS Picuda* (SS-382) have been scrapped. The *USS Stickleback* (SS-415) was lost in 1958. The *USS Entemedor* (SS-340), *USS Pomfret* (SS-391), *USS Sea Fox* (SS-402), and the *USS Threadfin* (SS-410) served in Turkey until the 1980s or 1990s, but their current status is unknown, and the *USS Hardhead* (SS-365) served in Greece until 1993, but its current status is also unknown.

[30] Information on the *USS Razorback* (SS-394) found at: http://www.subnet.com/fleet/ss394.htm.

[31] *Ibid.*

[32] *Ibid.*

[33] *Ibid.* "TCG" stands for Turkiye Cumhuriyeti Gemisi, which means Ship of the Turkish Republic.

[34] Captain Alaettin Sevim, Naval Attaché in the Turkish Embassy Defense Attaché Office and last Commander of the *TCG Murat Reis*. E-mail to the author 31 August 2004. and information on Turkish Naval policy found at: http://www.ozturkler.com/data_english/0003/0003_12_10.htm.

The transfer of a submarine from the U.S. Navy to the Turkish Navy was not a new phenomenon when the *Razorback* was transferred in 1970. After World War II and the Truman Doctrine, Turkey was one of the nations to which the U.S. decided to give military aid. After the Turks and Americans met in Turkey for talks in 1947, it was decided that, among other things, four submarines would be transferred to the Turkish Navy. The Turkish crews came to the U.S. on February 20, 1948, and after two months of training, the *USS Blueback*, *USS Boarfish*, *USS Chub*, and the *USS Brill* left for Turkey on April 19. They were commissioned in Turkey on May 23, 1948, as the *TCG 2.Inonu*, *TCG Sakarya*, *TCG Gur*, and the *TCG 1.Inonu*, respectively. Additional transfers of submarines also occurred in the 1950s and 1960s.[35]

Although the *Razorback* was decommissioned and transferred to Turkey on November 30, 1970, she spent the time until October 1971 being overhauled at Hunter's Point Naval Shipyard. She sailed for Turkey shortly afterwards, arriving there on November 17, 1971, and was commissioned one month later.[36]

Initially, the *Murat Reis* was assigned to Submarine Division One, which had its homeport in the City of Eregli on the Black Sea coast. However, after the collapse of the Warsaw Pact in 1991, she was reassigned to the City of Golcuk on the coast of the Sea of Marmara with the rest of Submarine Division One. She remained stationed there until her decommissioning.[37]

Due to the secret and classified nature of the Turkish submarine operations, little information is available about the *Murat Reis'* duties while in the Turkish Navy. However, it is known that she conducted forty-one patrols and exercises during wartime operations and international crises, including active involvement in the Cyprus Peace Operation in 1974. She fired a total of fifty-six warheads and training torpedoes, which earned her the title of the "most successful submarine in torpedo attack" in 1991.[38]

After thirty years of service in the Turkish Navy as the *TCG Murat Reis*, she was decommissioned in August 2001.[39] Although Turkey had thought about scrapping the *Razorback*, the intervention of submarine veterans groups and the City of North Little Rock brought about 2½ years of negotiations between U.S. and Turkish officials that ultimately led to the sale of the submarine to the City of North Little Rock for $37,000 in

[35] Information on the History of Turkish Submarines during the Years of American Military Aid (1948-1972) found at: http://www.turkishnavy.net/submarine/hist3.htm.
[36] *Ibid.*
[37] Captain Alaettin Sevim, Naval Attaché in the Turkish Embassy Defense Attaché Office and last Commander of the *TCG Murat Reis*. E-mail to the author 31 August 2004.
[38] *Ibid.*
[39] Jake Sandlin. "NLR sub docks in New Orleans," *Arkansas Democrat-Gazette*. 20 June 2004, pp. 1B, 3B.

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2004.[40] On March 25, 2004, in a ceremony at the Turkish Naval Shipyard in Golcuk, Turkey, Mayor Patrick Hays accepted transfer of title for the *Razorback* in front of Turkish and U.S. Embassy dignitaries.[41]

Once the *Razorback* was transferred to the City of North Little Rock, the long process of bringing the vessel to Arkansas began. From Golcuk, Turkey, the vessel traveled a short distance to a commercial shipyard in Tuzla where approximately five weeks worth of work were performed in order to prepare her for towing across the Atlantic, including removing the batteries.[42] In early May all was ready, and the *Razorback* left Istanbul on May 5, 2004, beginning its long journey to Arkansas.[43] Just over one month later, on June 13, the *Razorback* finally made it back to American soil, making an overnight pit stop in Key West, Florida, for some light maintenance.[44]

The *Razorback* left Key West on June 14 en route to New Orleans where additional maintenance and preparations were scheduled before the submarine's last leg of the journey up the Mississippi and Arkansas rivers. She arrived in New Orleans on June 19, 2004, and more maintenance along with a fresh paint job was completed.[45] In addition, she was changed from being pulled by an ocean-going tow vessel to being placed between two barges for the remainder of the trip.[46]

By July 3, 2004, the *Razorback* had begun the journey from New Orleans to its final destination in North Little Rock. The vessel was due to participate in the dedication of the Montgomery Point Lock and Dam at the mouth of the Arkansas River on July 16, before arriving in North Little Rock on July 18. Although she was able to make it to Montgomery Point, the arrival in North Little Rock was delayed due to the low water levels in the Arkansas River. At some places the river was only nine feet deep, and the submarine was drafting approximately fifteen feet. As a result, the *Razorback* was moored at Rosedale, Mississippi, until the problem could be solved.[47]

The initial plan to raise the *Razorback* involved emptying the ballast tanks of water and old fuel, and also removing approximately 300 lead bricks. However, it only raised her approximately a foot. Success was

[40] "Arrival of USS Razorback submarine delayed," *Arkansas Democrat-Gazette*. 11 July 2004, p. 1B, and Taylor Smith, Sandra. Telephone conversation with the author. 13 August 2004.
[41] Jake Sandlin. "NLR's naval museum takes shape Mayor given title to submarine; Navy picks city to receive tugboat," Arkansas *Democrat-Gazette*. 26 March 2004, found at: http://www.northlr.org/maritime-museum/news-clips/3.26.04/default.asp.
[42] "Turkey sub headed for repairs," *North Little Rock Times*. 18 March 2004, found at: http://www.northlr.org/maritime-museum/news-clips/3.18.04/default.asp.
[43] "Arrival of USS Razorback submarine delayed," *Arkansas Democrat-Gazette*. 11 July 2004, p. 1B.
[44] Timothy O'Hara. "History lies below decks," *Key West Citizen*. 12 June 2004, found at: http://www.northlr.org/maritime-museum/news-clips/06.12.04/default.asp.
[45] Jake Sandlin. "NLR sub docks in New Orleans," *Arkansas Democrat-Gazette*. 20 June 2004, pp. 1B, 3B.
[46] Jake Sandlin. "Historical sub 'junk' handled with care," *Arkansas Democrat-Gazette*. 22 June 2004, pp. 1B, 3B.
[47] "Arrival of USS Razorback submarine delayed," *Arkansas Democrat-Gazette*. 11 July 2004, p. 1B.

finally achieved by submerging two barges alongside her, sliding lifting bridles underneath the submarine, and then raising the barges, which also raised the *Razorback*. Once it was raised to a good level, it remained in place in Rosedale to make sure it would remain stable.[48]

On approximately August 1, the *Razorback* was finally ready to head up the Arkansas River under the guidance of the towboat *Brother Wilson*, a trip that would take approximately thirty hours. Finally, at approximately 2:30 p.m. on August 3, she arrived at the Port of Little Rock. A broom attached to the top of the submarine, bristles up, signaled "mission accomplished," a tradition that dated from World War II. After a trip of almost three months and 6,500 miles the *USS Razorback* had finally arrived at its final destination.[49]

After a public homecoming celebration for the *Razorback* on August 29, 2004, it is planned that the submarine will be one of the centerpieces of the proposed $15 million Arkansas Inland Maritime Museum (AIMM), which will be located on the banks of the Arkansas River in downtown North Little Rock. The anticipated arrival of the *USS Hoga* (NHL designation 06/30/89) in the near future will also be a major event for the proposed museum. The museum will allow many people from around the country and around the world to learn more about America's maritime past.

The preservation of the *USS Razorback* represents a monumental achievement of the City of North Little Rock and the various submarine veterans organizations that have been involved for the past several years in acquiring the vessel from Turkey and then getting it North Little Rock. However, the *Razorback*, as the last remaining example of a Balao class submarines that underwent Guppy IIA modifications in the United States, represents a very rare and significant type of submarine. In addition, as the longest serving submarine in the world at the time of her decommissioning in Turkey in 2001, and the last operational submarine that was present in Tokyo Bay on September 2, 1945, to take part in the formal surrender of Japan, the *USS Razorback* represents and illustrates an important part of America's maritime past.

STATEMENT OF SIGNIFICANCE

The *USS Razorback* is being nominated to the National Register of Historic Places under **Criterion C** with **national significance** as an excellent example of a Balao class submarine with Guppy IIA modifications. Of the thirteen Balao class submarines that underwent Guppy IIA modifications between 1952 and 1954, the *USS Razorback* is the last remaining example in the United States, and one of the few remaining examples in the world. The *USS Razorback* is also being nominated to the National Register under **Criterion A** for her role in U.S. maritime and military history. Having served in the U.S. and Turkish navies from her commissioning in April 1944 until she was decommissioned in August 2001, the *USS Razorback* was the longest-serving submarine in the world at the time of her decommissioning. In addition, the *USS Razorback*

[48] Stephen Deere. "Sub's end of voyage in sight, Hays says," *Arkansas Democrat-Gazette*. 22 July 2004, pp. 1B, 4B.
[49] Van Jensen. "Razorback ends latest 'adventure' at LR Port," *Arkansas Democrat-Gazette*. 4 August 2004, pp. 1A, 12A.

is the last operational submarine that was present in Tokyo Bay on September 2, 1945, to take part in the formal surrender of Japan, which officially ended World War II. During its distinguished U.S. military career, the *USS Razorback* earned five battle stars for her WW II service and four stars for her service in Vietnam.

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Section number 10 Page 1

VERBAL BOUNDARY DESCRIPTION

The *USS Razorback* is moored on the north bank of the Arkansas River in the vicinity of the I-30 Bridge at the future site of the Arkansas Inland Maritime Museum (UTM: 15/567389/3845772).

BOUNDARY JUSTIFICATION

The boundary encompasses the entire area of the *USS Razorback*.

10. Geographical Data

Acreage of Property Less than one.

UTM References
(Place additional UTM references on a continuation sheet.)

	Zone	Easting	Northing		Zone	Easting	Northing
1	15	567389	3845772	3			
2				4			

☐ See continuation sheet

Verbal Boundary Description
(Describe the boundaries of the property on a continuation sheet.)

Boundary Justification
(Explain why the boundaries were selected on a continuation sheet.)

11. Form Prepared By

name/title Ralph S. Wilcox, National Register & Survey Coordinator
organization Arkansas Historic Preservation Program date September 1, 2004
street & number 1500 Tower Building, 323 Center Street telephone (501) 324-9787
city or town Little Rock state AR zip code 72201

Additional Documentation

Submit the following items with the completed form:

Continuation Sheets

Maps

A **USGS map** (7.5 or 15 minute series) indicating the property's location

A **Sketch map** for historic districts and properties having large acreage or numerous resources.

Photographs

Representative **black and white photographs** of the property.

Additional items
(Check with the SHPO or FPO for any additional items.)

Property Owner

(Complete this item at the request of SHPO or FPO.)

name City of North Little Rock
street & number 120 Main Street, PO Box 936 telephone (501) 975-8888
city or town North Little Rock state AR zip code 72115-0936

United States Department of the Interior
National Park Service

National Register of Historic Places Continuation Sheet

Section number 7 Page 1

SUMMARY

The *USS Razorback* (SS-394) is a Balao class submarine built by the Portsmouth Naval Shipyard in Kittery, Maine, in 1943-1944. She was operated by the U.S. Navy until November 30, 1970, when she was decommissioned and transferred to the Turkish Navy and recommissioned as the *TCG Murat Reis* (S-336). The *Razorback* was decommissioned by the Turkish Navy in August 2001. After being acquired by the City of North Little Rock, the *Razorback* was towed to North Little Rock in 2004 where she will be on display as part of the planned Arkansas Inland Maritime Museum (AIMM). Of the thirteen Balao class submarines that underwent Guppy IIA modifications, the *Razorback* is the last one remaining in the United States, and one of only a few left in the world.

ELABORATION

The general original specifications for the *USS Razorback* are as follows:

Class:	Balao class submarine
Builder:	Portsmouth Naval Shipyard in Kittery, Maine
Length:	311'7"
Beam:	27'3"
Draft:	15'3"
Displacement:	1,870 tons (surfaced), 2,391 tons (submerged)
Top speed:	20.25 knots (surfaced), 8.75 knots (submerged)
Test depth:	400'
Guns:	1 – 3" 50 cal.
Torpedo tubes:	6 – 21" tubes forward, 4 – 21" tubes aft
Crew:	6 officers, 60 enlisted men
Power:	4 Diesel engines and 4 electric motors for 6,500 maximum horsepower surfaced and 2,740 maximum horsepower submerged
Range:	11,800 nautical miles at 10 knots surfaced

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

NATIONAL REGISTER OF HISTORIC PLACES
EVALUATION/RETURN SHEET

REQUESTED ACTION: NOMINATION

PROPERTY NAME: USS RAZORBACK (SS-394)

MULTIPLE NAME:

STATE & COUNTY: ARKANSAS, Pulaski

DATE RECEIVED: 12/06/04 DATE OF PENDING LIST: 1/04/05
DATE OF 16TH DAY: 1/19/05 DATE OF 45TH DAY: 1/19/05

DATE OF WEEKLY LIST:

REFERENCE NUMBER: 04001502

NOMINATOR: STATE

REASONS FOR REVIEW:

APPEAL:	N	DATA PROBLEM:	N	LANDSCAPE:	N	LESS THAN 50 YEARS:	N
OTHER:	N	PDIL:	N	PERIOD:	N	PROGRAM UNAPPROVED:	N
REQUEST:	N	SAMPLE:	N	SLR DRAFT:	N	NATIONAL:	N

COMMENT WAIVER: N

___ACCEPT ___RETURN ___REJECT_____DATE

ABSTRACT/SUMMARY COMMENTS:

Return. Please see attached comments.

RECOM./CRITERIA_____

REVIEWER Daniel Vivian DISCIPLINE Historian

TELEPHONE (202) 354-2252 DATE 1/19/05

DOCUMENTATION see attached comments Y/N see attached SLR Y/N

If a nomination is returned to the nominating authority, the nomination is no longer under consideration by the National Park Service.

The United States Department of the Interior
National Park Service

National Register of Historic Places
Evaluation/Return Sheet

Property Name: *USS Razorback* (SS-394)
Pulaski County, Arkansas

Reference Number: 04001502

Reason for Return:

This nomination is being returned because of questions concerning the significance and integrity of the property. Although the nomination demonstrates that the *USS Razorback* (SS-394) is one of the few surviving Balao-class submarines that underwent Guppy IIA modifications and participated in important military actions during World War II, it does not justify a period of significance through 1955. The narrative statement of significance includes a detailed discussion of the *USS Razorback*'s service during World War II and demonstrates that the submarine achieved significance for its combat actions and participation in the surrender ceremony that took place in Tokyo Harbor in August-September 1945. The information provided, however, does not justify the remainder of the period of significance (1946-1955). What was significant about the Guppy IIA program? Why is the *USS Razorback* a significant example of a submarine that underwent modifications through the program? How were the modifications significant in the context of naval engineering design? We recommend that the nomination be revised to explain the significance of the Guppy IIA program.

A related question concerns the activities of the submarine during the late 1950s and 1960s. Did the *USS Razorback* achieve significance for its operations during this period? Was it involved in any actions related to the Cold War-era defense of the United States? Was its participation in the Vietnam War significant? What was the purpose of the submarine's patrols in the South China Sea and the Western Pacific during the late 1960s? If these activities were significant, then it appears that a period of significance through 1970 may be justified. The limited information provided about the service of the *USS Razorback* during the 1950s and 1960s suggests, but not demonstrate, that it was significant. We recommend that the submarine be reevaluated to determine if it is significant for the ca. 1955-1970 period.

The information provided does not demonstrate that the *USS Razorback* retains integrity from its period of significance. Although the statement concerning integrity on page 4 of the narrative property description states that the submarine retains integrity, the nomination provides little information about repairs and modifications that may have been made to the submarine since the mid-1950s. How much has the submarine changed since the Guppy IIA modifications were completed? Are all of the components and equipment installed through the Guppy IIA program still intact? Did the Turkish navy make any significant modifications to the submarine? We recommend that additional information be provided to demonstrate that the submarine retains integrity from its period of significance.

We hope you find these comments useful and look forward to receiving a revised nomination. Please feel free to contact me if you have any questions. You may reach me at (202) 354-2252 or by email at <Dan_Vivian@nps.gov>.

Daniel Vivian, Historian
National Register of Historic Places

February 1, 2005

The Department of
Arkansas
Heritage

Mike Huckabee, Governor
Cathie Matthews, Director

Arkansas Arts Council
▪
Arkansas Natural Heritage Commission
▪
Historic Arkansas Museum
▪
Delta Cultural Center
▪
Old State House Museum

Arkansas Historic Preservation Program

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www.arkansaspreservation.org

December 1, 2004

Carol D. Shull
Chief of Registration
United States Department of the Interior
National Register of Historic Places
National Park Service
8th Floor
1201 Eye Street, NW
Washington, DC 20005

RE: *USS Razorback (SS-394)* – North Little Rock, Pulaski County, Arkansas

Dear Carol:

We are enclosing for your review the above-referenced nomination. The Arkansas Historic Preservation Program has complied with all applicable nominating procedures and notification requirements in the nomination process.

If you need further information, please call Ralph S. Wilcox of my staff at (501) 324-9787. Thank you for your cooperation in this matter.

Sincerely,

Cathie Matthews

Cathie Matthews
State Historic Preservation Officer

CM:rsw

Enclosure

NPS Form 10-900
(Oct. 1990)

OMB No. 10024-0018

United States Department of the Interior
National Park Service

National Register of Historic Places Registration Form

This form is for use in nominating or requesting determinations for individual properties and districts. See instructions in *How to Complete the National Register of Historic Places Registration Form* (National Register Bulletin 16A). Complete each item by marking "x" in the appropriate box or by entering the information requested. If an item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, architectural classification, materials, and areas of significance, enter only categories and subcategories from the instructions. Place additional entries and narrative items on continuation sheets (NPS Form 10-900a). Use a typewriter, word processor, or computer, to complete all items.

1. Name of Property

historic name *USS Razorback* (SS-394)

other names/site number *TCG Murat Reis* (S-336), Site #PU8144

2. Location

street & number North bank of the Arkansas River in the vicinity of the I-30 Bridge ☐ not for publication

city or town North Little Rock ☐ vicinity

state Arkansas code AR county Pulaski code 119 zip code 72114

3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act, as amended, I hereby certify that this ☒ nomination ☐ request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set for in 36 CFR Part 60. In my opinion, the property ☒ meets ☐ does not meet the National Register criteria. I recommend that this property be considered significant ☒ nationally ☐ statewide ☐ locally. (See continuation sheet for additional comments.)

Cathie Matthews 4/14/05

Signature of certifying official/Title Date

Arkansas Historic Preservation Program

State or Federal agency and bureau

In my opinion, the property ☐ meets ☐ does not meet the National Register criteria. (☐ See Continuation sheet for additional comments.)

Signature of certifying official/Title Date

State or Federal agency and bureau

4. National Park Service Certification

I hereby certify that the property is:

Signature of the Keeper Date of Action

- ☐ entered in the National Register.
  - ☐ See continuation sheet
- ☐ determined eligible for the National Register.
  - ☐ See continuation sheet
- ☐ determined not eligible for the National Register.
- ☐ removed from the National Register.
- ☐ other, (explain:) _____

5. Classification

Ownership of Property
(Check as many boxes as apply)

- ☐ private
- ☒ public-local
- ☐ public-State
- ☐ public-Federal

Category of Property
(Check only one box)

- ☐ building(s)
- ☐ district
- ☐ site
- ☒ structure
- ☐ object

Number of Resources within Property
(Do not include previously listed resources in count.)

Contributing	Noncontributing	
		buildings
		sites
1		structures
		objects
1		Total

Name of related multiple property listing
(Enter "N/A" if property is not part of a multiple property listing.)

N/A

Number of Contributing resources previously listed in the National Register

6. Function or Use

Historic Functions
(Enter categories from instructions)

DEFENSE/naval facility/submarine

Current Functions
(Enter categories from instructions)

OTHER/museum

7. Description

Architectural Classification
(Enter categories from instructions)

N/A

Materials
(Enter categories from instructions)

foundation N/A
walls N/A
roof N/A
other STEEL

Narrative Description
(Describe the historic and current condition of the property on one or more continuation sheets.)

United States Department of the Interior
National Park Service

National Register of Historic Places Continuation Sheet

Section number 7 Page 1

SUMMARY

The *USS Razorback* (SS-394) is a Balao class submarine built by the Portsmouth Naval Shipyard in Kittery, Maine, in 1943-1944. She was operated by the U.S. Navy until November 30, 1970, when she was decommissioned and transferred to the Turkish Navy and recommissioned as the *TCG Murat Reis* (S-336). The *Razorback* was decommissioned by the Turkish Navy in August 2001. After being acquired by the City of North Little Rock, the *Razorback* was towed to North Little Rock in 2004 where she will be on display as part of the planned Arkansas Inland Maritime Museum (AIMM). Of the thirteen Balao class submarines that underwent Guppy IIA modifications, the *Razorback* is the last one remaining in the United States, and one of only a few left in the world.

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Crew:	6 officers, 60 enlisted men
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Range:	11,800 nautical miles at 10 knots surfaced

United States Department of the Interior
National Park Service

National Register of Historic Places Continuation Sheet

In August 1952 the *USS Razorback* was briefly decommissioned and returned to the Portsmouth Naval Shipyard in order to participate in the Greater Underwater Propulsion Power Program (also known as "GUPPY"). The Guppy program was initiated by the Navy after World War II in order to improve the submerged speed, maneuverability, and endurance of their submarines. Specifically, the *Razorback* participated in the Guppy IIA program, which ran from 1952 through 1954. As with the Guppy II program, the Guppy IIA program streamlined the submarine, installed a new sail, a guppy bow, and new motors where they were necessary. The Guppy IIA program, however, went further in that it replaced one forward engine with air-conditioning plants and refrigeration units. The submarine's chill box and freeze boxes were relocated to the forward end of the after battery located under the galley. In addition, submarines that underwent the Guppy IIA modifications had the sonar moved to available space in the forward end of the pump room and some boats had the high-pressure air compressors moved to the lower level of the forward engine room. The only exterior difference between submarines that underwent the Guppy II and Guppy IIA modifications is that the Guppy IIA boats only had three diesel exhaust outlets instead of four.

In all, thirteen Balao class and four Tench class submarines had the Guppy IIA modifications. The Guppy IIA modifications were completed on the *Razorback* mainly in 1953 and she was recommissioned in January 1954.

Exterior
The exterior of the *Razorback* is covered in 7/8" thick steel plating, which forms the outer hull of the vessel. The general shape of the *Razorback* is roughly cylindrical with tapered forward and aft ends. The top of the vessel also has a steel and wood superstructure that creates a flat area to walk on. The superstructure also provides access to the *Razorback's* hatches and the ladders that scale the conning tower.

Along both sides of the vessel, in between the top of the hull and the bottom of the superstructure, are a series of perforations that allow water to drain out of the space underneath the superstructure. In addition, the exhaust ports for the submarine's three diesel engines are located near the top of the hull towards the aft end of the vessel.

The most prominent feature of the submarine's exterior is the conning tower slightly towards the forward end of the vessel. The tower features a rounded forward end and a tapered rear. The front features a series of five small rectangular windows near the top of the tower, and the number "394" is painted in white towards the bottom front of the tower. (During the time that the vessel served in the Turkish Navy as the *TCG Murat Reis*, "S336" was painted in white towards the center of the conning tower's sides.) The periscopes, if deployed, extend out of the top of the tower.

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Interior

The interior of the *Razorback* contains eight major areas, which are, proceeding from the front of the submarine to the rear: Forward Torpedo Room, Officer's Area with the Forward Battery Area below, Control Room with the Sonar Room below and conning tower above, the Crew's Galley and Bathing/Bunk Area with the After Battery Area below, the Forward Engine Room, the After Engine Room, the Maneuvering Room, and the Aft Torpedo Room. Although each of these areas is mainly devoted to one purpose, they also may be used for other secondary functions, such as the location of extra bunks.

The forward torpedo room is the first area seen in the front of the vessel, and it contains the six forward torpedo tubes, racks for torpedo storage, and a few bunks. The space still contains the original tubes, storage racks, and bunks, and reflects its historic appearance.

Proceeding towards the aft of the vessel, the next area encountered is the officers' area. This area contains the officers' mess hall, galley, and quarters. As with the forward torpedo room, the officers' area reflects its historic appearance. Below the officers' area is the forward battery room. The batteries, however, were removed just prior to the *Razorback's* departure from Turkey in 2001.

The next area seen when proceeding aft in the *Razorback* is the control room. The control room contains the main controls of the submarine. Again, this part of the vessel reflects its historic appearance. Below the control room is the sonar room, which allowed the *Razorback's* crew to determine the distance between their vessel and other vessels through sending sound waves through the water. (Sonar stands for **SO**und **N**avigation **A**nd **R**anging.) The sonar room reflects the Guppy IIA modifications done to the submarine in 1952-1953. A ladder in the control room also provides access to the conning tower, where the submarine's two periscopes are located.

The next area of the vessel proceeding aft is the crew's galley, mess hall, and quarters. The crew's quarters consists of four tiers of metal bunks. Below the crew's area is the aft battery area. Again, the batteries in this area were removed just prior to the *Razorback's* departure from Turkey in 2001.

Proceeding aft, the next area is the forward engine room. The forward engine room currently reflects the Guppy IIA modifications done to the submarine in 1952-1953, which replaced one forward engine with air-conditioning plants and refrigeration units. The aft engine room, however, still retains both engines.

The next area proceeding aft in the vessel is the maneuvering room where the electric motor controls are located. The electric motors, which are used to power the boat while submerged, were powered by the batteries that were contained in spaces below the deck of the officers' and crew's areas.

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The aft torpedo room is the final area of the submarine proceeding aft. This torpedo room contains four torpedo tubes, rather than the six tubes found in the forward torpedo room. Like the forward torpedo room, it also contains racks for torpedo storage, and a few bunks. The space still contains the original tubes, storage racks, and bunks, and reflects its historic appearance.

Integrity

The *USS Razorback* possesses very strong integrity. The submarine is still operational and many of the systems were used in aiding its voyage from Turkey to North Little Rock in 2004. Since the *Razorback* was built, parts of the submarine have been replaced and repaired. However, this is a normal practice for naval vessels as parts wear out. In addition, although the *Razorback* was modified in the early 1950s with the Guppy IIA upgrades, those upgrades are more than fifty years old, and contribute to the vessel's significance by illustrating the evolution of submarine design over time. The *USS Razorback* currently resides in the Arkansas River in downtown North Little Rock. Although it did not historically operate on the Arkansas River, the *Razorback* did operate in other U.S. rivers, specifically the Piscataqua River adjacent to the Portsmouth Naval Shipyard and the Thames River adjacent to the Naval Submarine Base in New London, Connecticut. As a result, its current setting still reflects the *Razorback's* period of significance while it was in operation in the U.S. Navy.

The transfer of the *USS Razorback* directly from the Turkish Navy to the City of North Little Rock, without having it prepared for a proposed scrapping, has also allowed the vessel to retain remarkable integrity. The *Razorback* retains items that other submarines that are now museums likely do not, such as her complete sonar system and many operating manuals, some in English and some in Turkish. To date, thirty boxes and numerous bags of items have been removed for cataloguing, including a framed photograph of Kemal Atatürk, a pair of shoes found in an officer's quarters, and a set of photograph negatives found in the captain's desk showing the ceremony that transferred the *Razorback* to Turkey in 1970. Also, according to several veterans who served on the vessel prior to 1970, and have seen her since she returned to North Little Rock, the Turkish Navy did not undertake any major alterations to the vessel. Changes to the vessel by the Turks were limited to regular maintenance issues, installing plaques in Turkish around the vessel, and replacing the galley's coffee pot with a teapot. Overall, the *Razorback* is a uniquely intact example of a Balao class submarine with Guppy IIA modifications, and is able to convey a very complete picture of what life on a submarine was like from World War II to the beginnings of the twenty-first century.

8. Statement of Significance

Applicable National Register Criteria
(Mark "x" in one or more boxes for the criteria qualifying the property for National Register listing.)

- ☒ **A** Property is associated with events that have made a significant contribution to the broad patterns of our history.
- ☐ **B** Property is associated with the lives of persons significant in our past.
- ☒ **C** Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.
- ☐ **D** Property has yielded, or is likely to yield, information important in prehistory or history.

Criteria Considerations
(Mark "x" in all the boxes that apply.)

Property is:

- ☐ **A** owned by a religious institution or used for religious purposes.
- ☐ **B** removed from its original location.
- ☐ **C**. birthplace or grave of a historical figure of outstanding importance.
- ☐ **D** a cemetery.
- ☐ **E** a reconstructed building, object, or structure.
- ☐ **F** a commemorative property
- ☒ **G** less than 50 years of age or achieved significance within the past 50 years.

Levels of Significance (local, state, national)
National

Areas of Significance (Enter categories from instructions)
Engineering
Maritime History
Military

Period of Significance
1943-1970

Significant Dates
1943-1970

Significant Person (Complete if Criterion B is marked)

Cultural Affiliation (Complete if Criterion D is marked)

Architect/Builder
Portsmouth Naval Shipyard, Builder

Narrative Statement of Significance
(Explain the significance of the property on one or more continuation sheets.)

9. Major Bibliographical References

Bibliography
(Cite the books, articles, and other sources used in preparing this form on one or more continuation sheets.)

Previous documentation on file (NPS):

- ☐ preliminary determination of individual listing (36 CFR 67) has been requested
- ☐ previously listed in the National Register
- ☐ Previously determined eligible by the National Register
- ☐ designated a National Historic Landmark
- ☐ recorded by Historic American Buildings Survey #
- ☐ recorded by Historic American Engineering Record #

Primary location of additional data:

- ☒ State Historic Preservation Office
- ☐ Other State Agency
- ☐ Federal Agency
- ☒ Local Government
- ☐ University
- ☐ Other

Name of repository: City of North Little Rock

10. Geographical Data

Acreage of Property Less than one.

UTM References
(Place additional UTM references on a continuation sheet.)

	Zone	Easting	Northing		Zone	Easting	Northing
1	15	567389	3845772	3			
2				4			

☐ See continuation sheet

Verbal Boundary Description
(Describe the boundaries of the property on a continuation sheet.)

Boundary Justification
(Explain why the boundaries were selected on a continuation sheet.)

11. Form Prepared By

name/title Ralph S. Wilcox, National Register & Survey Coordinator
organization Arkansas Historic Preservation Program date April 14, 2005
street & number 1500 Tower Building, 323 Center Street telephone (501) 324-9787
city or town Little Rock state AR zip code 72201

Additional Documentation

Submit the following items with the completed form:

Continuation Sheets

Maps

A **USGS map** (7.5 or 15 minute series) indicating the property's location

A **Sketch map** for historic districts and properties having large acreage or numerous resources.

Photographs

Representative **black and white photographs** of the property.

Additional items
(Check with the SHPO or FPO for any additional items.)

Property Owner

(Complete this item at the request of SHPO or FPO.)

name City of North Little Rock
street & number 120 Main Street, PO Box 936 telephone (501) 975-8888
city or town North Little Rock state AR zip code 72115-0936

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SUMMARY

The *USS Razorback* is being nominated to the National Register of Historic Places under **Criterion C** with **national significance** as an excellent example of a Balao class submarine with Guppy IIA modifications. Of the thirteen Balao class submarines that underwent Guppy IIA modifications between 1952 and 1954, the *USS Razorback* is the last remaining example in the United States, and one of the few remaining examples in the world. The *USS Razorback* is also being nominated to the National Register under **Criterion A** for her role in U.S. maritime and military history. Having served in the U.S. and Turkish navies from her commissioning in April 1944 until she was decommissioned in August 2001, the *USS Razorback* was the longest-serving submarine in the world at the time of her decommissioning. In addition, the *USS Razorback* is the last operational submarine that was present in Tokyo Bay on September 2, 1945, to take part in the formal surrender of Japan, which officially ended World War II. During its distinguished U.S. military career, the *USS Razorback* earned five battle stars for her WW II service and four stars for her service in Vietnam.

ELABORATION

Although the notions and possibilities of underwater travel were thought of in ancient times by people such as Herodotus, Aristotle, and Pliny the Elder, the first apparent successful submarine voyage did not occur until 1620 with a craft built by Cornelius Drebbel (or Van Drebel, according to some sources).[1] Drebbel used designs drawn in 1578 by William Bourne, a British mathematician and naval writer, and constructed a vessel with a wooden frame and a watertight hull made of greased leather. Propulsion was provided for with twelve oars that extended through the sides, and air was supplied via tubes that were supported on the water's surface by floats.[2] One of the first passengers to ride on Drebbel's vessel was King James I of England who was elated about his voyage to a depth of 15 feet.[3]

By 1727 there were fourteen patents in England alone that had been issued for submarines, including one for a forerunner of the modern ballast tank. It employed goatskin bags that were attached to the hull and also attached to an aperture in the submarine's bottom. As the vessel descended below the water's surface, the bags would take on water. When the vessel was ready to surface, a twisting rod would force the water from the skins.[4]

It would not be until 1775 that the United States would become involved in submarine construction when David Bushnell built a vessel named the *Turtle*. The purpose of the *Turtle* was to get rid of the British

[1] Charles Panati. *Panati's Browser's Book of Beginnings*. Boston: Houghton Mifflin Co., 1984, pp. 321-322.
[2] Commander C. W. Rush, W. C. Chambliss, and H. J. Gimpel. *The Complete Book of Submarines*. Cleveland: The World Publishing Company, 1958, p. 12.
[3] Panati, p.322.
[4] *Ibid.*

blockade of New York harbor.[5] While a student at Yale University, Bushnell became interested in and solved the problem of exploding gunpowder underwater. If gunpowder could be exploded underwater, particularly under a British ship, then the problem of the British Blockade of New York could be potentially solved. As a result, he designed and built the *Turtle* with an oak hull bound with iron bands, and the submarine measured 7½ feet long and 6 feet tall.[6] Although most of the cost of construction was financed by Bushnell, she was also partially funded by the State of Connecticut.[7]

On September 6, 1776, the *Turtle*, piloted by Sgt. Ezra Lee, set out to attack the *H.M.S. Eagle*. Although Lee was not able to fasten the mine to the ship's hull, he released the mine as he withdrew. The subsequent explosion did not damage any of the British ships, but it did frighten them enough to move their ships downstream. Bushnell would try two more attacks later in September, and on October 6 the boat carrying the *Turtle* was sunk. Although the submarine was salvaged, she apparently did not see any more action.[8] Nevertheless, the era of the American submarine was born.

Even though the *Turtle* proved that the use of submarines could be a valuable asset to the Navy, it was not until the early twentieth century that the Navy embraced the idea by announcing specifications for a proposed submarine and inviting bids. The person who would eventually be selected by the Navy was John Holland the head of the Holland Torpedo Boat Company. Holland had been experimenting with submarines for almost twenty-five years, and he thought of a submarine that would go beneath the water's surface using engine power and neutral buoyancy.[9]

Although Holland's company won the Navy's contract for their first submarine, he believed that the Navy's specifications would not result in a satisfactory vessel, and he would be proved correct. The Navy required that the vessel be propelled by a steam engine on the surface and electric motors while submerged. However, the length of time required to extinguish the fire and vent the steam from the boilers of the steam engine prior to diving was unacceptable. In addition, the boat's interior was excruciatingly hot underwater from the residual heat.[10]

Since Holland's first submarine for the Navy proved unacceptable, it was scrapped and another vessel, this time using a gasoline engine for surface propulsion, was constructed. A gasoline engine could be shut down instantly, and transfer to electric propulsion could be accomplished with the flick of a switch. The second

[5] Norman Friedman. *U.S. Submarines Through 1945: An Illustrated Design History*. Annapolis: Naval Institute Press, 1995, p. 11.
[6] Rush, et al., p. 13.
[7] Friedman, p. 11.
[8] Friedman, pp. 11-12.
[9] Rush, et al., p. 23.
[10] Rush, et al., pp. 23-25.

vessel was much better, and was accepted by the Navy on April 11, 1900. In fact, the vessel was named the *USS Holland* in honor of John Holland, and Holland's company, which eventually became the Electric Boat Division of General Dynamics Corporation, has been the Navy's consistent civilian partner in submarine construction.[11]

After World War I, the Navy began to invest in earnest in submarine development, and their first long-range vessel, the *Argonaut*, was built in 1928. She had a length of 381 feet and a displacement of 2,710 tons, and was the largest non-nuclear submarine ever deployed by the Navy.[12] The *Argonaut* was built specifically as a minelayer, and she was armed with four forward torpedo tubes and could carry sixty mines. The design of the *Argonaut* was the forerunner of the Gato and Balao classes, and employed design features, such as a horizontal cylindrical conning tower, that would become standard on future submarines.[13]

The Gato class represented the state of the art submarine at the beginning of World War II. They were based on the previous Tambor class and incorporated all of the experience gained from the previous classes as well as experience gained during the war. The Gato class became the standard design built during the war, and it was also well-suited to mass production given the fact that it employed a fully welded design. Most of the modifications were internal, and included full air-conditioning and crew comforts that were necessary for long-range Pacific patrols.[14]

Like the Gato class, the Balao class, which included the *USS Razorback*, was an evolutionary submarine designed that was based on previous classes, specifically the Gato class. (The term "Balao" is another name for the Halfbeak, a slender marine fish with a protruding lower jaw.) Although many of the improvements in the Balao class were internal, the most significant improvement was the use of higher strength steel (7/8" thick rather than 9/16" thick), which allowed a test depth of 400 feet rather than the Gato class's 300 feet.[15]

The construction of the *USS Razorback* began on September 9, 1943, with the laying of the keel at the Portsmouth Naval Shipyard in Kittery, Maine.[16] (The term "Razorback" is another name for the Rorqual family of whales, which are characterized by throat grooves that extend from the throat to the flippers.) The Portsmouth Naval Shipyard (PNS), which was established in June 1800, is the oldest naval shipyard continuously operated by the U.S. government. The PNS's role in submarine construction began in World

[11] Rush, et al., p. 25.
[12] Panati, pp.322-323.
[13] Panati, p. 323, and Friedman, p. 178.
[14] Anthony J. Watts. *Allied Submarines*. New York: Arco Publishing Company, Inc., 1977, p. 56.
[15] Friedman, p. 208, and Information on Balao class submarines found at: http://encyclopedia.thefreedictionary.com/Balao%20class%20submarine.
[16] Information on the *USS Razorback* (SS-394) found at: http://www.subnet.com/fleet/ss394.htm.

War I and greatly increased during World War II and the period of the *Razorback's* construction. A total of seventy submarines were built at PNS during WW II and, remarkably, four of them were launched on the same day. PNS remained the Navy's center for the design and development of submarines after WW II up into the nuclear age. The last submarine built in a public shipyard was the nuclear-powered *USS Sand Lance*, launched at PNS in 1969.[17]

By early 1944, the construction of the *Razorback* was far enough along that she was launched on January 27. Her sponsor was Mrs. Henry F.D. Davis, wife of the shipyard's industrial manager. Final construction details were then completed and the *Razorback* was commissioned on April 3, 1944, under the command of Lieutenant Commander Albert M. Bontier. (Bontier would later be killed in action on October 3, 1944, off Morotai Island in Indonesia in the loss of the submarine *USS Seawolf*.)[18]

Once the *Razorback* was commissioned, she underwent shakedown trials off of the New England coast before sailing to Pearl Harbor. Her first war patrol began on August 25 when she sailed west from Pearl Harbor to be a member of an offensive group conducting patrols east of Luzon in the Philippines in support of the mid-September landings on Palau. After the group only sighted enemy antisubmarine planes, the *Razorback* sailed northeastward, arriving at Midway on October 19, 1944.[19]

After a refit period in Midway, the *Razorback* departed on her second war patrol on November 15, 1944, accompanied by the *USS Trepang* (SS-412) and the *USS Segundo* (SS-398). The group of submarines operated in the Luzon Straits where the *Razorback* damaged a 6,933-ton freighter on December 6 and sank an 820-ton destroyer and damaged another freighter on December 30. She returned to Guam for refit, arriving on January 5, 1945.[20]

The *Razorback's* third war patrol began on February 1, 1945, when she set out for the East China Sea, accompanied by the *Segundo* and the *USS Sea Cat* (SS-399). In three separate surface gun actions she sank four wooden ships. After dropping three Japanese prisoners off at Guam, she proceeded to Pearl Harbor where she ended her patrol on March 26, 1945.[21]

On May 7, 1945, the *Razorback* headed west from Pearl Harbor to the Nanpo Shoto and Tokyo Bay areas where she was assigned to lifeguard duty for planes on patrols in the vicinity. While on duty she rescued four B-29 pilots and a fighter pilot before traveling to Midway for refit, arriving there on June 27.[22]

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[17] Information on Portsmouth Naval Shipyard found at: http://www.ports.navy.mil/history.htm.
[18] Information on the *USS Razorback* (SS-394) found at: http://www.subnet.com/fleet/ss394.htm.
[19] *Ibid.*
[20] *Ibid.*
[21] *Ibid.*
[22] *Ibid.*

The *Razorback's* last World War II patrol, and by far her most illustrious, began on July 22, 1945. She left Midway for patrols in the Russian Sea of Okhotsk, west of the Kamchatka Peninsula, where she sank six wooden cargo sea trucks and damaged two additional ones in a surface gun action. The rest of her patrol in the Kamchatka Peninsula area was spent performing lifeguard services off of Paramushiro Island for Alaska-based planes. However, in August 1945, the *Razorback* sailed south and on August 31 she entered Tokyo Harbor with eleven other submarines to take part in the formal surrender of Japan, which marked the official end of WW II.[23] After the surrender on September 2, she departed Tokyo Bay the following day to head for home, arriving in Pearl Harbor on September 11, and ultimately arriving in San Diego on September 20.[24]

Even after World War II was over, the *Razorback* remained active with the Pacific Fleet. In early 1948 and again in late 1949, she participated in patrols off of Japan and China. However, by 1952 it was time to update the *Razorback* and convert her to a Guppy IIA-type submarine.[25]

In August 1952 the *USS Razorback* was briefly decommissioned and returned to the Portsmouth Naval Shipyard in order to participate in the Greater Underwater Propulsion Power Program (also known as "GUPPY").[26] The Guppy program was initiated by the Navy after World War II in order to improve the submerged speed, maneuverability, and endurance of their submarines. Specifically, the *Razorback* participated in the Guppy IIA program, which ran from 1952 through 1954. As with the Guppy II program, the Guppy IIA program streamlined the submarine, installed a new sail, a guppy bow, and new motors where they were necessary. The Guppy IIA program, however, went further in that it replaced one forward engine with air-conditioning plants and refrigeration units. The submarine's chill box and freeze boxes were relocated to the forward end of the after battery located under the galley. In addition, submarines that underwent the Guppy IIA modifications had the sonar moved to available space in the forward end of the pump room and some boats had the high-pressure air compressors moved to the lower level of the forward engine room. The only exterior difference between submarines that underwent the Guppy II and Guppy IIA modifications is that the Guppy IIA boats only had three diesel exhaust outlets instead of four.[27] Significantly, the *Razorback* was the only Balao-class submarine in the Guppy program (Including Guppy I,

[23] Of the twelve submarines that were present in Tokyo Bay at the surrender, the *Razorback* is the only surviving operational submarine, and one of two total survivors. The other survivor, the *USS Cavalla* (SS-244) was opened as a museum in Galveston, Texas, in 1971. Information taken from: Jake Sandlin. "Navy vets re-enlist to escort sub home," *Arkansas Democrat-Gazette* 29 August 2004, pp. 1B, 7B.
[24] *Ibid.*
[25] *Ibid.*
[26] *Ibid.*
[27] Information on Guppy IIA conversions found at: http://encyclopedia.thefreedictionary.com/GUPPY%20IIA.

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IA, II, IIA, and III) that had her hull reinforced so that she could act as a live target for the MK 35 anti-submarine warfare torpedo then being developed for use by both submarines and surface ships.[28]

The Guppy IIA program was important as a direct response to the rapid buildup of the Soviet submarine fleet after World War II.[29] Due to the expected advances in Russian submarine technology, it was realized that the US fleet would have to be quickly modernized in order to keep up. It was also important that the surface Navy be able to learn how to detect, defend against, and attack, if necessary, the fast Soviet submarines, and an American equivalent would be able to provide that training. Although a new class of submarine, the Tang class, which was largely based on captured German technology, was begun in 1949, it was clear early on that it would be too expensive to build the numbers of vessels needed to counter the Soviet threat. The Guppy IIA program was specifically designed to upgrade existing submarines to meet or exceed the abilities of the Tang-class vessels in a more cost effective manner.[30]

Due to the improvements in performance that the Guppy IIA program brought about, there was a general program shift in submarine missions and operations. Prior to the Guppy IIA program, submarines were mainly meant to attack and sink surface ships while they themselves were on the surface. However, the Guppy IIA program began a trend in which submarines started specializing almost entirely in submerged anti-submarine warfare.[31] In addition, the program also resulted in impacts on the development of US anti-submarine warfare weapons, sensors, and tactics. For example, the streamlining of the vessels through the Guppy IIA program resulted in at least a 10% reduction in the submarine's detection range. These improvements forced the Navy to improve existing sensors, such as sonar and radar systems, make faster anti-submarine warfare ships, and develop longer-ranged weapons.[32]

In all, thirteen Balao class and four Tench class submarines had the Guppy IIA modifications.[33] However, today, the *USS Razorback* is the last remaining example in the United States, and one of only two remaining examples in the world of a Balao-class submarine with the Guppy IIA modifications. Of the thirteen Balao-class submarines that had the Guppy IIA modifications, the *USS Diodon* (SS-349), *USS Jallao* (SS-368), *USS Menhaden* (SS-377), *USS Bang* (SS-385), *USS Ronquil* (SS-396), and the *USS Picuda* (SS-382) have been scrapped. The *USS Stickleback* (SS-415) was lost in 1958. The *USS Entemedor* (SS-340),

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[28] A. D. Baker. *U.S. Naval Institute Guide to Combat Fleets of the World, 2002-2003*. Annapolis, MD: US Naval Institute Press, 2002, p. 827.
[29] Charles Oldham, ed. *Underway on Nuclear Power: 50th Anniversary of USS* Nautilus. Tampa, FL: Faircount LLC, 2004, p. 19.
[30] J. L. Christy. *United States Naval Submarine Force Information Book – 1998*. Marblehead, MA: Graphic Enterprises of Marblehead, 1998, pp. 65, 144-145.
[31] Brayton Harris. *The Navy Times Book of Submarines*. New York: Berkley, 1997, p. 338.
[32] Friedman, pp. 40-41, 63.
[33] Information on Guppy IIA submarines found at: http://guppysubmarinetribute.homestead.com/Guppy2A.html.

USS Pomfret (SS-391), *USS Sea Fox* (SS-402), and the *USS Threadfin* (SS-410) served in Turkey until the 1980s or 1990s, and all four vessels have since been scrapped.[34] Finally, the *USS Hardhead* (SS-365) served in Greece until 1993, and is currently in storage at Suda Bay on the island of Crete.[35] The Guppy IIA modifications were completed on the *Razorback* mainly in 1953 and she was recommissioned in January 1954. After being recommissioned, she reported to SubRon 10 (Submarine Squadron 10) at New London, Connecticut, for shakedown and training.[36]

Once her shakedown and training exercises were completed in early 1954, the *Razorback* was transferred to the West Coast where she became a member of SubRon3 (Submarine Squadron 3) based in San Diego on May 24, 1954. For the rest of 1954 and 1955, she was involved in providing antisubmarine training services for local surface and air units. In 1956 her range was extended north to Canada.[37]

On June 24, 1957, the *Razorback* returned to duty in the Far East on her first deployment to that part of the world since the 1940s. She was regularly deployed as part of the 7th Fleet up into the 1960s, and on March 25, 1963, while in Yokosuka, Japan, she received an order from the Commander of Submarine Flotilla Seven that sent her on at least two special operations, one from March 26 through April 1, and one from April 3 through April 7. The deck log pages for the dates are only noted as "Special Operations" and the exact nature of the missions is currently unknown.[38] Her sailing into the South China Sea in 1965 helped her to earn her first Vietnam Service Medal during the deployment. She finished her deployment in 1966 and returned to San Diego on February 1. However, she left again for the western Pacific on December 29, 1966, and returned on July 3, 1967. Her third deployment to the Pacific lasted from August 6, 1968, until February 1969.[39] During her third deployment to the Pacific, the *Razorback* conducted a "mission of great value to the government of the United States." This, along with her involvement in "training and contingency missions" which were conducted in the Gulf of Tonkin area in support of Vietnamese operations led to the *Razorback* receiving her third Vietnam Service Medal.[40]

However, it was not just Vietnam War-related exercises that the *Razorback* participated in during the 1960s; she was involved with several operations related to the Cold War. The *Razorback's* Cold War involvement

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[34] Greg Zonner. E-mail to Sandra Taylor Smith of the North Little Rock History Commission. 11 April 2005.
[35] Adonakakis, Vagelis (LJG E. Adonakakis, Official in the Hellenic Navy). E-mail to the author. 24 January 2005.
[36] Information on the *USS Razorback* (SS-394) found at: http://www.subnet.com/fleet/ss394.htm.
[37] *Ibid.*
[38] *USS Razorback* Deck Log, 1963, Record Group 24; National Archives and Records Administration – National Archives at College Park.
[39] *Ibid.*
[40] *USS Razorback* Final Command History, 30 November 1970 – Ship's History Branch, US Naval Historical Center, Washington Navy Yard, Washington, DC, pp. 3-4.

began in January and February 1957 when she participated in the development of the Rocket-Assisted Torpedo weapons system (later known as the Anti-Submarine Rocket, or ASROC) with the Naval Ordnance Test Station. As a result of her service, she received a Letter of Commendation for her "outstanding performance of duty."[41]

The *Razorback's* Cold War involvement continued and escalated during the 1960s. On May 11, 1962, she participated in the SWORDFISH nuclear weapons test, which was a test of the ASROC weapon system configured with a nuclear depth charge as the warhead. The warhead was launched by at a target raft circled by diagnostic devices by the destroyer *Agerholm* (DD-826). The *Razorback*, which had a full crew aboard and was submerged at periscope depth two nautical miles from ground zero, was tossed around by the detonation.[42]

The SWORDFISH test was significant as only one of two nuclear tests of "full up" naval nuclear weapons, or weapons fired from active duty ships under operational conditions. The data that the test generated helped to not only confirm the readiness of the entire weapons system, which included sensors, launcher, and the weapon and warhead, but it was also used to formulate tactical doctrine of the ASROC system. The ASROC system was designed to detect and engage hostile submarines out to a range of five nautical miles. The SWORDFISH test also helped to improve U.S. understanding of the effects of underwater nuclear weapons on both vessels and sensors, which helped to develop tactical doctrine that is still used for submarines today.[43]

After the SWORDFISH test was finished, the *Razorback* continued to work with units of the 1st Fleet in anti-submarine warfare and strike exercises that were "designed to improve the defensive posture of the United States."[44] She continued to participate in training exercises up through the mid-1960s, including three major exercises with various units of the Pacific Fleet and 1st Fleet in 1966. The *Razorback* also participated in OPERATION WEBFOOT, which was carried out in cooperation with the U.S. Coast Guard and had been designed to test the effectiveness of California's coastal defense against enemy agent infiltration.[45]

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[41] *USS Razorback Command History*, 16 January 1962 – Ship's History Branch, US Naval Historical Center, Washington Navy Yard, Washington, DC.

[42] Information on the Guppy program found at: http://www.globalsecurity.org/military/systems/ship/guppy.htm and information on Pacific nuclear tests found at: http://www.globalsecurity.org/military/systems/ship/guppy.htm.

[43] *Ibid.*

[44] *USS Razorback* Final Command History, 30 November 1970 – Shop's History Branch, US Naval Historical Center, Washington Navy Yard, Washington, DC, p.5.

[45] *USS Razorback* Command History, 02 February 1967 – Shop's History Branch, US Naval Historical Center, Washington Navy Yard, Washington, DC, pp. 1-2.

The *Razorback* likely participated in her last big test in October 1969 when she participated in Hunter Killer Anti-Submarine Exercise (HUKASWEX) 11-69. Although she received her orders to participate only 48 hours before the exercise began, she was commended for her challenging tactics by the Commander of anti-submarine warfare Group Three and the Commander of anti-submarine warfare forces in the Pacific.[46]

Although the *Razorback* received many commendations for her service in war and other tests and exercises, she received commendations for other activities as well. In July 1963, for example, while returning to the United States from a deployment to the Western Pacific, the *Razorback* rescued Vice Admiral Gerald F. Bogan, USN (ret.) and six others after they were forced to abandon their sinking yacht, *Freedom II*, midway between Hawaii and San Diego.[47] Two crewmen of the *Razorback* received citations from the Secretary of the Navy on another occasion for their actions in 1967 in aiding the rescue and treatment of two crew members from a downed U.S. Navy S-2E aircraft.[48] The *Razorback* was a well-respected member of the Navy's submarine fleet, as evidenced by being selected in 1964 as the Submarine Force, U.S. Pacific Fleet nominee for the Arleigh Burke Trophy, a trophy awarded annually to the most improved ship, submarine, or aviation squadron in each fleet. She was the most improved submarine in the Pacific Fleet, and received congratulations and "well done" from the Commander of the Submarine Force, U.S. Pacific Fleet on August 1, 1964.[49] She would receive several more commendations in 1969 including the coveted Navy "E" for overall excellence, her second award of that type, on July 2, 1969, for being the outstanding submarine of Submarine Division 32, the "Fire Control and Torpedo Performance Award" from the Commander of the Submarine Force, U.S. Pacific Fleet, as the winning submarine of Submarine Division 32's weapons readiness competition, and an overall mark of "outstanding" from the Commander of Submarine Squadron 3 after her annual command inspection in December 1969.[50]

Even though the *Razorback* was first and foremost a vessel meant to be used for protection and a weapon of war, she also fulfilled the role of goodwill ambassador during the 1960s. In July 1962, she participated in Seattle, Washington's, "Sea Fair," a fair that highlights the traditions, celebrations, and diversity of the Puget

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[46] *USS Razorback* Command History, 28 May 1970 – Ship's History Branch, US Naval Historical Center, Washington Navy Yard, Washington, DC, pp. 1,4.
[47] *USS Razorback* Final Command History, 30 November 1970 – Ship's History Branch, US Naval Historical Center, Washington Navy Yard, Washington, DC, p. 5.
[48] *USS Razorback* Command History, 02 February 1967 – Ship's History Branch, US Naval Historical Center, Washington Navy Yard, Washington, DC, p. 4.
[49] *USS Razorback* Final Command History, 30 November 1970 – Ship's History Branch, US Naval Historical Center, Washington Navy Yard, Washington, DC, p. 6.
[50] *USS Razorback* Command History, 28 May 1970 – Ship's History Branch, US Naval Historical Center, Washington Navy Yard, Washington, DC, pp. 1,4.

Sound area, and hosted 5,000 visitors during the event.[51] From June through August 1966, she served as the official host ship for BAP *Dos de Mayo* (S-41), a submarine from the Peruvian Navy, during her visit to San Diego, California. The *Razorback* provided significant material and professional assistance to *Dos de Mayo*, resulting in improved cooperation and goodwill between the U.S. and Peru.[52] Finally, in 1969, she hosted 3,575 visitors during the Portland, Oregon, Rose Festival as a representative of the Submarine Force, U.S. Pacific Fleet.[53]

During the remainder of 1969 and into January 1970, the *Razorback* operated on the West Coast, based in San Diego, California. However, on January 30, 1970, she left on her final deployment, again to the western Pacific, which lasted until August 7. On November 30, 1970, the *Razorback* was decommissioned at the Hunter's Point Naval Shipyard. At the same time that she was struck from the Navy List, the *Razorback* was transferred to the Turkish Navy and recommissioned as the *TCG Murat Reis* (S-336).[54] The submarine was named after Murat Reis, a famous admiral in the sixteenth-century Ottoman Navy who was best known for his work in the Indian seas in 1552 and 1553.[55]

The transfer of a submarine from the U.S. Navy to the Turkish Navy was not a new phenomenon when the *Razorback* was transferred in 1970. After World War II and the Truman Doctrine, Turkey was one of the nations to which the U.S. decided to give military aid. After the Turks and Americans met in Turkey for talks in 1947, it was decided that, among other things, four submarines would be transferred to the Turkish Navy. The Turkish crews came to the U.S. on February 20, 1948, and after two months of training, the *USS Blueback*, *USS Boarfish*, *USS Chub*, and the *USS Brill* left for Turkey on April 19. They were commissioned in Turkey on May 23, 1948, as the *TCG 2.Inonu*, *TCG Sakarya*, *TCG Gur*, and the *TCG 1.Inonu*, respectively. Additional transfers of submarines also occurred in the 1950s and 1960s.[56]

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[51] *USS Razorback* Command History, 07 January 1963 – Ship's History Branch, US Naval Historical Center, Washington Navy Yard, Washington, DC.

[52] *USS Razorback* Command History, 02 February 1967 – Ship's History Branch, US Naval Historical Center, Washington Navy Yard, Washington, DC, p. 4.

[53] *USS Razorback* Command History, 28 May 1970 – Ship's History Branch, US Naval Historical Center, Washington Navy Yard, Washington, DC, p. 1.

[54] *Ibid.* "TCG" stands for Turkiye Cumhuriyeti Gemisi, which means Ship of the Turkish Republic.

[55] Captain Alaettin Sevim, Naval Attaché in the Turkish Embassy Defense Attaché Office and last Commander of the *TCG Murat Reis*. E-mail to the author 31 August 2004. and information on Turkish Naval policy found at: http://www.ozturkler.com/data_english/0003/0003_12_10.htm.

[56] Information on the History of Turkish Submarines during the Years of American Military Aid (1948-1972) found at: http://www.turkishnavy.net/submarine/hist3.htm.

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Although the *Razorback* was decommissioned and transferred to Turkey on November 30, 1970, she spent the time until October 1971 being overhauled at Hunter's Point Naval Shipyard. She sailed for Turkey shortly afterwards, arriving there on November 17, 1971, and was commissioned one month later.[57]

Initially, the *Murat Reis* was assigned to Submarine Division One, which had its homeport in the City of Eregli on the Black Sea coast. However, after the collapse of the Warsaw Pact in 1991, she was reassigned to the City of Golcuk on the coast of the Sea of Marmara with the rest of Submarine Division One. She remained stationed there until her decommissioning.[58]

Due to the secret and classified nature of the Turkish submarine operations, little information is available about the *Murat Reis'* duties while in the Turkish Navy. However, it is known that she conducted forty-one patrols and exercises during wartime operations and international crises, including active involvement in the Cyprus Peace Operation in 1974. She fired a total of fifty-six warheads and training torpedoes, which earned her the title of the "most successful submarine in torpedo attack" in 1991.[59]

After thirty years of service in the Turkish Navy as the *TCG Murat Reis*, she was decommissioned in August 2001.[60] Although Turkey had thought about scrapping the *Razorback*, the intervention of submarine veterans groups and the City of North Little Rock brought about 2½ years of negotiations between U.S. and Turkish officials that ultimately led to the sale of the submarine to the City of North Little Rock for $37,000 in 2004.[61] On March 25, 2004, in a ceremony at the Turkish Naval Shipyard in Golcuk, Turkey, Mayor Patrick Hays accepted transfer of title for the *Razorback* in front of Turkish and U.S. Embassy dignitaries.[62]

Once the *Razorback* was transferred to the City of North Little Rock, the long process of bringing the vessel to Arkansas began. From Golcuk, Turkey, the vessel traveled a short distance to a commercial shipyard in Tuzla where approximately five weeks worth of work were performed in order to prepare her for towing across the Atlantic, including removing the batteries.[63] In early May all was ready, and the *Razorback* left Istanbul on May 5, 2004, beginning its long journey to Arkansas.[64] Just over one month later, on June 13,

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[57] *Ibid.*
[58] Captain Alaettin Sevim, Naval Attaché in the Turkish Embassy Defense Attaché Office and last Commander of the *TCG Murat Reis*. E-mail to the author 31 August 2004.
[59] *Ibid.*
[60] Jake Sandlin. "NLR sub docks in New Orleans," *Arkansas Democrat-Gazette*. 20 June 2004, pp. 1B, 3B.
[61] "Arrival of USS Razorback submarine delayed," *Arkansas Democrat-Gazette*. 11 July 2004, p. 1B, and Taylor Smith, Sandra. Telephone conversation with the author. 13 August 2004.
[62] Jake Sandlin. "NLR's naval museum takes shape Mayor given title to submarine; Navy picks city to receive tugboat," Arkansas *Democrat-Gazette*. 26 March 2004, found at: http://www.northlr.org/maritime-museum/news-clips/3.26.04/default.asp.
[63] "Turkey sub headed for repairs," *North Little Rock Times*. 18 March 2004, found at: http://www.northlr.org/maritime-museum/news-clips/3.18.04/default.asp.
[64] "Arrival of USS Razorback submarine delayed," *Arkansas Democrat-Gazette*. 11 July 2004, p. 1B.

the *Razorback* finally made it back to American soil, making an overnight pit stop in Key West, Florida, for some light maintenance.[65]

The *Razorback* left Key West on June 14 en route to New Orleans where additional maintenance and preparations were scheduled before the submarine's last leg of the journey up the Mississippi and Arkansas rivers. She arrived in New Orleans on June 19, 2004, and more maintenance along with a fresh paint job was completed.[66] In addition, she was changed from being pulled by an ocean-going tow vessel to being placed between two barges for the remainder of the trip.[67]

By July 3, 2004, the *Razorback* had begun the journey from New Orleans to its final destination in North Little Rock. The vessel was due to participate in the dedication of the Montgomery Point Lock and Dam at the mouth of the Arkansas River on July 16, before arriving in North Little Rock on July 18. Although she was able to make it to Montgomery Point, the arrival in North Little Rock was delayed due to the low water levels in the Arkansas River. At some places the river was only nine feet deep, and the submarine was drafting approximately fifteen feet. As a result, the *Razorback* was moored at Rosedale, Mississippi, until the problem could be solved.[68]

The initial plan to raise the *Razorback* involved emptying the ballast tanks of water and old fuel, and also removing approximately 300 lead bricks. However, it only raised her approximately a foot. Success was finally achieved by submerging two barges alongside her, sliding lifting bridles underneath the submarine, and then raising the barges, which also raised the *Razorback*. Once it was raised to a good level, it remained in place in Rosedale to make sure it would remain stable.[69]

On approximately August 1, the *Razorback* was finally ready to head up the Arkansas River under the guidance of the towboat *Brother Wilson*, a trip that would take approximately thirty hours. Finally, at approximately 2:30 p.m. on August 3, she arrived at the Port of Little Rock. A broom attached to the top of the submarine, bristles up, signaled "mission accomplished," a tradition that dated from World War II. After a trip of almost three months and 6,500 miles the *USS Razorback* had finally arrived at its final destination.[70]

After a public homecoming celebration for the *Razorback* on August 29, 2004, it is planned that the submarine will be one of the centerpieces of the proposed $15 million Arkansas Inland Maritime Museum

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[65] Timothy O'Hara. "History lies below decks," *Key West Citizen*. 12 June 2004, found at: http://www.northlr.org/maritime-museum/news-clips/06.12.04/default.asp.
[66] Jake Sandlin. "NLR sub docks in New Orleans," *Arkansas Democrat-Gazette*. 20 June 2004, pp. 1B, 3B.
[67] Jake Sandlin. "Historical sub 'junk' handled with care," *Arkansas Democrat-Gazette*. 22 June 2004, pp. 1B, 3B.
[68] "Arrival of USS Razorback submarine delayed," *Arkansas Democrat-Gazette*. 11 July 2004, p. 1B.
[69] Stephen Deere. "Sub's end of voyage in sight, Hays says," *Arkansas Democrat-Gazette*. 22 July 2004, pp. 1B, 4B.
[70] Van Jensen. "Razorback ends latest 'adventure' at LR Port," *Arkansas Democrat-Gazette*. 4 August 2004, pp. 1A, 12A.

(AIMM), which will be located on the banks of the Arkansas River in downtown North Little Rock. The anticipated arrival of the *USS Hoga* (NHL designation 06/30/89) in the near future will also be a major event for the proposed museum. The museum will allow many people from around the country and around the world to learn more about America's maritime past.

The preservation of the *USS Razorback* represents a monumental achievement of the City of North Little Rock and the various submarine veterans organizations that have been involved for the past several years in acquiring the vessel from Turkey and then getting it North Little Rock. However, the *Razorback*, as the last remaining example of a Balao class submarines that underwent Guppy IIA modifications in the United States, represents a very rare and significant type of submarine. In addition, as the longest serving submarine in the world at the time of her decommissioning in Turkey in 2001, and the last operational submarine that was present in Tokyo Bay on September 2, 1945, to take part in the formal surrender of Japan, the *USS Razorback* represents and illustrates an important part of America's maritime past.

STATEMENT OF SIGNIFICANCE

The *USS Razorback* is being nominated to the National Register of Historic Places under **Criterion C** with **national significance** as an excellent example of a Balao class submarine with Guppy IIA modifications. Of the thirteen Balao class submarines that underwent Guppy IIA modifications between 1952 and 1954, the *USS Razorback* is the last remaining example in the United States, and one of the few remaining examples in the world. The *USS Razorback* is also being nominated to the National Register under **Criterion A** for her role in U.S. maritime and military history. Having served in the U.S. and Turkish navies from her commissioning in April 1944 until she was decommissioned in August 2001, the *USS Razorback* was the longest-serving submarine in the world at the time of her decommissioning. In addition, the *USS Razorback* is the last operational submarine that was present in Tokyo Bay on September 2, 1945, to take part in the formal surrender of Japan, which officially ended World War II. During its distinguished U.S. military career, the *USS Razorback* earned five battle stars for her WW II service and four stars for her service in Vietnam.

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VERBAL BOUNDARY DESCRIPTION

The *USS Razorback* is moored on the north bank of the Arkansas River in the vicinity of the I-30 Bridge at the future site of the Arkansas Inland Maritime Museum (UTM: 15/567389/3845772).

BOUNDARY JUSTIFICATION

The boundary encompasses the entire area of the *USS Razorback*.

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

NATIONAL REGISTER OF HISTORIC PLACES
EVALUATION/RETURN SHEET

REQUESTED ACTION: RESUBMISSION

PROPERTY NAME: USS RAZORBACK (SS-394)

MULTIPLE NAME:

STATE & COUNTY: ARKANSAS, Pulaski

DATE RECEIVED: 4/18/05 DATE OF PENDING LIST:
DATE OF 16TH DAY: DATE OF 45TH DAY: 6/01/05
DATE OF WEEKLY LIST:

REFERENCE NUMBER: 04001502

DETAILED EVALUATION:

___ACCEPT ___RETURN ___REJECT _____DATE

ABSTRACT/SUMMARY COMMENTS:

Return. Please see attached comments.

RECOM./CRITERIA_____

REVIEWER Daniel Vivian DISCIPLINE Historian

TELEPHONE (202) 354-2252 DATE 6/1/05

DOCUMENTATION see attached comments Y/N see attached SLR Y/N

The United States Department of the Interior
National Park Service

National Register of Historic Places
Evaluation/Return Sheet

Property Name: USS *Razorback* (SS-394)
Pulaski County, Arkansas

Reference Number: 04001502

Reason for Return:

This nomination is being returned because of questions concerning the significance and integrity of the property. As you know, it is unusual for our office to return a nomination for a second time. In the case of the nomination for the USS *Razorback*, however, the information provided in response to our return comments of February 1, 2005, clarified some questions concerning the significance of the submarine but suggested additional revisions to the historic context and left other questions unanswered, especially in regard to the integrity of the property. Based on the information provided, it appears that the USS *Razorback* may meet the National Register criteria as an example of a Balao class submarine modified during phase IIA of the Greater Underwater Propulsion Power program (Guppy) and for its role in the ceremony that took place in Tokyo Bay on September 2, 1945, to mark the formal surrender of Japan. However, the nomination does not justify the significance of the submarine in the area of engineering nor demonstrate that it is significant in a national context. We recommend that the nomination be revised to clarify the modifications made through the Guppy IIA program and better describe the importance of the Guppy program in the context of the early Cold War.

The following comments have been developed in consultation with the staff of the NPS Maritime Heritage Program.

Significance
Based on the information provided, it appears that the submarine may meet Criterion A for its role in the ceremony that marked the formal surrender of Japan and Criterion C for the modifications made through the Guppy IIA program. It appears, however, that important details have been left out of the discussion of the Guppy IIA program (Section 8, pp. 5-7). As a result,

the nomination does not adequately explain the property's engineering significance in the context of the early Cold War. In addition to the modifications discussed in the nomination—specifically the hull streamlining, installation of air-conditioning plants and refrigeration units, and rearrangement of sonar equipment and chill and freeze boxes—sources consulted during our review indicate that the Guppy IIA program also included installation of a snorkel air-breathing system critical to the operation of the submarine. Other sources indicate that at least some Guppy modifications included installation of fire control systems. To justify the significance of the Guppy IIA program, the nomination must describe the full scope of the modifications made through the program, identify their most important elements, explain their significance, and show that the submarine retains integrity from its period of significance. For authoritative information about the Guppy IIA program, we recommend consulting two books by Norman Friedman, a noted authority on submarine design: U.S. Submarines Since 1945: An Illustrated Design History (Annapolis, Md.: Naval Institute Press, 1994) and Submarine Design and Development (Annapolis, Md.: Naval Institute Press, 1984). We have also enclosed information from an online exhibit about submarines developed by the National Museum of American History and from a website dedicated to the history of the Guppy program, which may prove useful in revising the nomination.

In discussing the significance of the USS *Razorback* in the area of engineering, it may also be helpful for the nomination to explain how the submarine differs from similar submarines that are listed in the National Register or have been designated by the Secretary of the Interior as National Historic Landmarks (NHLs). Several Balao class submarines, including two that participated in the Guppy program, are NHLs: the USS *Becuna*, USS *Bowfin*, USS *Clamagore*, USS *Lionfish*, and the USS *Pampanito*. Of these, the USS *Becuna* was modified during the Guppy IA program and the USS *Clamagore* was modified during the Guppy III program. While the nomination discusses other Balao and Tench class submarines that had Guppy IIA modifications (Section 8, pp. 6-7), it would be helpful to identify any relevant properties that are listed in the National Register or designated as NHLs.

We also recommend that the nomination be revised to provide additional contextual information on the significance of the Guppy program in the early stages of the Cold War. While general information about this context is provided in the nomination (Section 8, p. 6), the importance of submarine operations during the Cold War is not entirely clear. The sources mentioned above provide considerable information about the role Guppy-modified and Tang class submarines played in these operations. Throughout the Cold War, U.S. submarines conducted patrols around the globe, monitoring Soviet submarines entering the North Atlantic through the narrow gap between Greenland, Iceland, and the United Kingdom, tracking Soviet submarines on training exercises in the Dardanelles, and operating in the Pacific, where they monitored Soviet operations in ports such as Vladivostok and on the Kola Peninsula. We recommend that the nomination be revised to discuss the importance of submarine operations during the Cold War and explain why the U.S. Navy believed it absolutely essential that its submarine fleet match or exceed the operational capabilities of Soviet submarines. In particular, the nomination should discuss the strategic goals behind the Guppy program and related initiatives that sought to improve U.S. submarine warfare capabilities.

The information provided in response to our comments of February 1, 2005, indicates that the USS *Razorback* is not exceptionally significant for its participation in Cold War-era operations after 1955 and during the Vietnam War. Consequently, we recommend that the period of significance be revised to 1943-1955. The submarine does not appear to possess the exceptional significance necessary to meet Criterion Consideration G.

In addition, the nomination does not demonstrate that the submarine is significant in a national context. How did the USS *Razorback* influence the course of nationally-important events? Was the Guppy IIA program nationally significant in the area of engineering? For its role in military history during the early stages of the Cold War? Did the submarine's service in World War II play a significant role in naval operations in the Pacific? Did its wartime service contribute significantly to the surrender of Japan? How does the significance of the USS *Razorback* compare to that of other submarines that are listed in the National Register or as NHLs? To what major themes in American history did the USS *Razorback* contribute? We recommend that these questions be considered in evaluating the significance of the property.

Integrity

The nomination does not demonstrate that the submarine retains integrity from its period of significance. In particular, it is unclear if the equipment installed and modifications made through the Guppy IIA program are substantially intact. Photographs shown on the websites of the North Little Rock Maritime Museum (www.northlr.org/maritime-museum/photo-gallery/) and the USSVI Razorback Base (www.razorbackbase.com) indicate that the submarine underwent three distinct phases of evolution: 1) its initial configuration, as commissioned in 1944 and operated into the early 1950s, 2) its Guppy IIA configuration, circa 1954 through and undetermined date, and 3) its current configuration, which existed by the time the submarine was transferred to the Turkish navy in 1970. (See enclosed copies labeled "Phase I," "Phase II," and "Phase III.") The difference between the Guppy IIA configuration and its current appearance is most clearly evident in the sail. The sail installed during the Guppy IIA modifications rose from the hull in two distinct stages, a broad base and somewhat smaller superstructure, on top of which were at least two antennae. By contrast, current sail is a broad, somewhat wider and possibly taller form. Only two phases of evolution are discussed in the nomination: the submarine's original form and the modifications made during the Guppy IIA program. Thus, it is unclear when the submarine assumed its current form.

Because the nomination does not account for all major phases of the its evolution, it is unclear if the submarine retains integrity from its period of significance. When did the USS *Razorback* assume its current form? The changes to the sail made subsequent to the Guppy IIA modifications suggest that changes to internal equipment may have been made at the same time, thereby raising questions about how much of the equipment installed through the Guppy IIA program survives. In addition, it seems plausible that at least some of the equipment used during the submarine's service in the U.S. Navy may have been removed before the transfer to the Turkish Navy in 1970. To demonstrate that the submarine conveys the engineering significance of the Guppy IIA program, the nomination must show that the external and internal modifications and equipment installed during the 1952-1954 period remain substantially intact. How much of

the Guppy IIA machinery and equipment remains intact? What changes were made in the late 1950s or 1960s that resulted in the current form and appearance of the property? Were these changes limited to installation of a new sail, or were other modifications made at the same time. What modifications, if any, were made to the submarine prior to its transfer to the Turkish Navy? Were any modifications made during its service in the Turkish Navy?

We hope you find these comments useful in reevaluating the significance of the submarine and determining if it retain integrity from its historic period. Please feel free to contact me if you have any questions. You may reach me at (202) 354-2252 or by email at <Dan_Vivian@nps.gov>.

Daniel Vivian, Historian
National Register of Historic Places

June 1, 2005

The Department of
Arkansas
Heritage

Mike Huckabee, Governor
Cathie Matthews, Director

Arkansas Arts Council

Arkansas Natural Heritage Commission

Delta Cultural Center

Historic Arkansas Museum

Mosaic Templars Cultural Center

Old State House Museum

Arkansas Historic Preservation Program

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An Equal Opportunity Employer

April 14, 2005

Carol D. Shull
Chief of Registration
United States Department of the Interior
National Register of Historic Places
National Park Service
8th Floor
1201 Eye Street, NW
Washington, DC 20005

RE: *USS Razorback (SS-394)* – North Little Rock, Pulaski County, Arkansas

Dear Carol:

We are enclosing for your review the above-referenced revised nomination. The Arkansas Historic Preservation Program has complied with all applicable nominating procedures and notification requirements in the nomination process.

If you need further information, please call Ralph S. Wilcox of my staff at (501) 324-9787. Thank you for your cooperation in this matter.

Sincerely,

Cathie Matthews

Cathie Matthews
State Historic Preservation Officer

CM:rsw

Enclosure

NPS Form 10-900
(Oct. 1990)

OMB No. 10024-0018

United States Department of the Interior
National Park Service

National Register of Historic Places Registration Form

This form is for use in nominating or requesting determinations for individual properties and districts. See instructions in *How to Complete the National Register of Historic Places Registration Form* (National Register Bulletin 16A). Complete each item by marking "x" in the appropriate box or by entering the information requested. If an item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, architectural classification, materials, and areas of significance, enter only categories and subcategories from the instructions. Place additional entries and narrative items on continuation sheets (NPS Form 10-900a). Use a typewriter, word processor, or computer, to complete all items.

1. Name of Property

historic name *USS Razorback* (SS-394)

other names/site number *TCG Murat Reis* (S-336), Site #PU8144

2. Location

street & number North bank of the Arkansas River in the vicinity of the I-30 Bridge ☐ not for publication

city or town North Little Rock ☐ vicinity

state Arkansas code AR county Pulaski code 119 zip code 72114

3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act, as amended, I hereby certify that this ☒ nomination ☐ request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set for in 36 CFR Part 60. In my opinion, the property ☒ meets ☐ does not meet the National Register criteria. I recommend that this property be considered significant ☒ nationally ☐ statewide ☐ locally. (See continuation sheet for additional comments.)

Cathie Matthews 8/4/05

Signature of certifying official/Title — Date

Arkansas Historic Preservation Program

State or Federal agency and bureau

In my opinion, the property ☐ meets ☐ does not meet the National Register criteria. (☐ See Continuation sheet for additional comments.)

Signature of certifying official/Title — Date

State or Federal agency and bureau

4. National Park Service Certification

I hereby certify that the property is:

☒ entered in the National Register.
☐ See continuation sheet
☐ determined eligible for the National Register.
☐ See continuation sheet
☐ determined not eligible for the National Register.
☐ removed from the National Register.
☐ other, (explain:) _____

for Daniel J. Vivian 9/1/05

Signature of the Keeper — Date of Action

5. Classification

Ownership of Property
(Check as many boxes as apply)

- ☐ private
- ☒ public-local
- ☐ public-State
- ☐ public-Federal

Category of Property
(Check only one box)

- ☐ building(s)
- ☐ district
- ☐ site
- ☒ structure
- ☐ object

Number of Resources within Property
(Do not include previously listed resources in count.)

Contributing	Noncontributing	
		buildings
		sites
1		structures
		objects
1		Total

Name of related multiple property listing
(Enter "N/A" if property is not part of a multiple property listing.)

N/A

Number of Contributing resources previously listed in the National Register

6. Function or Use

Historic Functions
(Enter categories from instructions)

DEFENSE/naval facility/submarine

Current Functions
(Enter categories from instructions)

OTHER/museum

7. Description

Architectural Classification
(Enter categories from instructions)

N/A

Materials
(Enter categories from instructions)

foundation N/A
walls N/A
roof N/A
other STEEL

Narrative Description
(Describe the historic and current condition of the property on one or more continuation sheets.)

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National Park Service

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SUMMARY

The *USS Razorback* (SS-394) is a Balao class submarine built by the Portsmouth Naval Shipyard in Kittery, Maine, in 1943-1944. She was operated by the U.S. Navy until November 30, 1970, when she was decommissioned and transferred to the Turkish Navy and recommissioned as the *TCG Murat Reis* (S-336). The *Razorback* was decommissioned by the Turkish Navy in August 2001. After being acquired by the City of North Little Rock, the *Razorback* was towed to North Little Rock in 2004 where she will be on display as part of the planned Arkansas Inland Maritime Museum (AIMM). Of the thirteen Balao class submarines that underwent Guppy IIA modifications, the *Razorback* is the last one remaining in the United States, and one of only two left in the world.

ELABORATION

The general original specifications for the *USS Razorback* are as follows:

Class:	Balao class submarine
Builder:	Portsmouth Naval Shipyard in Kittery, Maine
Length:	311'7"
Beam:	27'3"
Draft:	15'3"
Displacement:	1,870 tons (surfaced), 2,391 tons (submerged)
Top speed:	20.25 knots (surfaced), 8.75 knots (submerged)
Test depth:	400'
Guns:	1 – 3" 50 cal.
Torpedo tubes:	6 – 21" tubes forward, 4 – 21" tubes aft
Crew:	6 officers, 60 enlisted men
Power:	4 Diesel engines and 4 electric motors for 6,500 maximum horsepower surfaced and 2,740 maximum horsepower submerged
Range:	11,800 nautical miles at 10 knots surfaced

United States Department of the Interior
National Park Service

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In August 1952 the *USS Razorback* was briefly decommissioned and returned to the Portsmouth Naval Shipyard in order to participate in the Greater Underwater Propulsion Power Program (also known as "GUPPY"). The Guppy program was initiated by the Navy after World War II in order to improve the submerged speed, maneuverability, and endurance of their submarines. Specifically, the *Razorback* participated in the Guppy IIA program, which ran from 1952 through 1954. As with the Guppy II program, the Guppy IIA program streamlined the submarine, installed a new sail, a guppy bow, and new motors where they were necessary. The Guppy IIA program, however, went further in that it replaced one forward engine with air-conditioning plants and refrigeration units. The submarine's chill box and freeze boxes were relocated to the forward end of the after battery located under the galley. In addition, submarines that underwent the Guppy IIA modifications had the sonar moved to available space in the forward end of the pump room and some boats had the high-pressure air compressors moved to the lower level of the forward engine room. The only exterior difference between submarines that underwent the Guppy II and Guppy IIA modifications is that the Guppy IIA boats only had three diesel exhaust outlets instead of four.

In all, thirteen Balao class and four Tench class submarines had the Guppy IIA modifications. The Guppy IIA modifications were completed on the *Razorback* mainly in 1953 and she was recommissioned in January 1954.

Exterior
The exterior of the *Razorback* is covered in 7/8" thick steel plating, which forms the outer hull of the vessel. The general shape of the *Razorback* is roughly cylindrical with tapered forward and aft ends. The top of the vessel also has a steel and wood superstructure that creates a flat area to walk on. The superstructure also provides access to the *Razorback's* hatches and the ladders that scale the conning tower.

Along both sides of the vessel, in between the top of the hull and the bottom of the superstructure, are a series of perforations that allow water to drain out of the space underneath the superstructure. In addition, the exhaust ports for the submarine's three diesel engines are located near the top of the hull towards the aft end of the vessel.

The most prominent feature of the submarine's exterior is the conning tower slightly towards the forward end of the vessel. The tower features a rounded forward end and a tapered rear. The front features a series of five small rectangular windows near the top of the tower, and the number "394" is painted in white towards the bottom front of the tower. (During the time that the vessel served in the Turkish Navy as the *TCG Murat Reis*, "S336" was painted in white towards the center of the conning tower's sides.) The periscopes, if deployed, extend out of the top of the tower.

Interior

The interior of the *Razorback* contains eight major areas, which are, proceeding from the front of the submarine to the rear: Forward Torpedo Room, Officer's Area with the Forward Battery Area below, Control Room with the Sonar Room below and conning tower above, the Crew's Galley and Bathing/Bunk Area with the After Battery Area below, the Forward Engine Room, the After Engine Room, the Maneuvering Room, and the Aft Torpedo Room. Although each of these areas is mainly devoted to one purpose, they also may be used for other secondary functions, such as the location of extra bunks.

The forward torpedo room is the first area seen in the front of the vessel, and it contains the six forward torpedo tubes, racks for torpedo storage, and a few bunks. The space still contains the original tubes, storage racks, and bunks, and reflects its historic appearance.

Proceeding towards the aft of the vessel, the next area encountered is the officers' area. This area contains the officers' mess hall, galley, and quarters. As with the forward torpedo room, the officers' area reflects its historic appearance. Below the officers' area is the forward battery room. The batteries, however, were removed just prior to the *Razorback's* departure from Turkey in 2004.

The next area seen when proceeding aft in the *Razorback* is the control room. The control room contains the main controls of the submarine. Again, this part of the vessel reflects its historic appearance. Below the control room is the sonar room, which allowed the *Razorback's* crew to determine the distance between their vessel and other vessels through sending sound waves through the water. (Sonar stands for **SO**und **N**avigation **A**nd **R**anging.) The sonar room reflects the Guppy IIA modifications done to the submarine in 1952-1953. A ladder in the control room also provides access to the conning tower, where the submarine's two periscopes are located.

The next area of the vessel proceeding aft is the crew's galley, mess hall, and quarters. The crew's quarters consists of four tiers of metal bunks. Below the crew's area is the aft battery area. Again, the batteries in this area were removed just prior to the *Razorback's* departure from Turkey in 2004.

Proceeding aft, the next area is the forward engine room. The forward engine room currently reflects the Guppy IIA modifications done to the submarine in 1952-1953, which replaced one forward engine with air-conditioning plants and refrigeration units. The aft engine room, however, still retains both engines.

The next area proceeding aft in the vessel is the maneuvering room where the electric motor controls are located. The electric motors, which are used to power the boat while submerged, were powered by the batteries that were contained in spaces below the deck of the officers' and crew's areas.

The aft torpedo room is the final area of the submarine proceeding aft. This torpedo room contains four torpedo tubes, rather than the six tubes found in the forward torpedo room. Like the forward torpedo room, it also contains racks for torpedo storage, and a few bunks. The space still contains the original tubes, storage racks, and bunks, and reflects its historic appearance.

Integrity

The *USS Razorback* possesses very strong integrity. The submarine is still operational and many of the systems were used in aiding its voyage from Turkey to North Little Rock in 2004. Since the *Razorback* was built, parts of the submarine have been replaced and repaired. However, this is a normal practice for naval vessels as parts wear out. In addition, although the *Razorback* was modified in the early 1950s with the Guppy IIA upgrades, those upgrades are more than fifty years old, and contribute to the vessel's significance by illustrating the evolution of submarine design over time. One change that did occur within the last fifty years, however, was the installation of the current sail, which is referred to as a "Northern Sail." The design of the Northern sail allowed the bridge to be higher up in the vessel so that it could be manned in rough weather. The sail was installed at the San Francisco shipyard between December 1961 and February 1962, and no other changes were undertaken to the *Razorback* when the sail was installed. However, the installation of a more modern sail, as with the Guppy IIA modifications, illustrates the evolution of submarine design over time.

The *USS Razorback* currently resides in the Arkansas River in downtown North Little Rock. Although it did not historically operate on the Arkansas River, the *Razorback* did operate in other U.S. rivers, specifically the Piscataqua River adjacent to the Portsmouth Naval Shipyard and the Thames River adjacent to the Naval Submarine Base in New London, Connecticut. As a result, its current setting still reflects the *Razorback's* period of significance while it was in operation in the U.S. Navy.

The transfer of the *USS Razorback* directly from the Turkish Navy to the City of North Little Rock, without having it prepared for a proposed scrapping, has also allowed the vessel to retain remarkable integrity. The *Razorback* retains items that other submarines that are now museums likely do not, such as her complete sonar system and many operating manuals, some in English and some in Turkish. To date, thirty boxes and numerous bags of items have been removed for cataloguing, including a framed photograph of Kemal Atatürk, a pair of shoes found in an officer's quarters, and a set of photograph negatives found in the captain's desk showing the ceremony that transferred the *Razorback* to Turkey in 1970. Also, according to several veterans who served on the vessel prior to 1970, and have seen her since she returned to North Little Rock, the Turkish Navy did not undertake any major alterations to the vessel. Changes to the vessel by the Turks were limited to regular maintenance issues, installing plaques in Turkish around the vessel, and replacing the galley's coffee pot with a teapot. Overall, the *Razorback* is a uniquely intact example of a Balao class submarine with Guppy IIA modifications, and is able to convey a very complete picture of what life on a submarine was like from World War II to the beginnings of the twenty-first century.

8. Statement of Significance

Applicable National Register Criteria
(Mark "x" in one or more boxes for the criteria qualifying the property for National Register listing.)

☒ **A** Property is associated with events that have made a significant contribution to the broad patterns of our history.

☐ **B** Property is associated with the lives of persons significant in our past.

☒ **C** Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.

☐ **D** Property has yielded, or is likely to yield, information important in prehistory or history.

Criteria Considerations
(Mark "x" in all the boxes that apply.)
Property is:

☐ **A** owned by a religious institution or used for religious purposes.

☐ **B** removed from its original location.

☐ **C**. birthplace or grave of a historical figure of outstanding importance.

☐ **D** a cemetery.

☐ **E** a reconstructed building, object, or structure.

☐ **F** a commemorative property

☐ **G** less than 50 years of age or achieved significance within the past 50 years.

Levels of Significance (local, state, national)
National

Areas of Significance (Enter categories from instructions)
Engineering
Maritime History
Military

Period of Significance
1943-1955

Significant Dates
1943-1955

Significant Person (Complete if Criterion B is marked)

Cultural Affiliation (Complete if Criterion D is marked)

Architect/Builder
Portsmouth Naval Shipyard, Builder

Narrative Statement of Significance
(Explain the significance of the property on one or more continuation sheets.)

9. Major Bibliographical References

Bibliography
(Cite the books, articles, and other sources used in preparing this form on one or more continuation sheets.)

Previous documentation on file (NPS):

☐ preliminary determination of individual listing (36 CFR 67) has been requested
☐ previously listed in the National Register
☐ Previously determined eligible by the National Register
☐ designated a National Historic Landmark
☐ recorded by Historic American Buildings Survey #
☐ recorded by Historic American Engineering Record #

Primary location of additional data:

☒ State Historic Preservation Office
☐ Other State Agency
☐ Federal Agency
☒ Local Government
☐ University
☐ Other

Name of repository: City of North Little Rock

United States Department of the Interior
National Park Service

National Register of Historic Places Continuation Sheet

Section number 8 Page 1

SUMMARY

The *USS Razorback* is being nominated to the National Register of Historic Places under **Criterion C** with **national significance** as an excellent example of a Balao class submarine with Guppy IIA modifications. Of the thirteen Balao class submarines that underwent Guppy IIA modifications between 1952 and 1954, the *USS Razorback* is the last remaining example in the United States, and one of two remaining examples in the world. The *USS Razorback* is also being nominated to the National Register under **Criterion A** for her role in U.S. maritime and military history. Having served in the U.S. and Turkish navies from her commissioning in April 1944 until she was decommissioned in August 2001, the *USS Razorback* was the longest-serving submarine in the world at the time of her decommissioning. In addition, the *USS Razorback* is the last operational submarine that was present in Tokyo Bay on September 2, 1945, to take part in the formal surrender of Japan, which officially ended World War II. During its distinguished U.S. military career, the *USS Razorback* earned five battle stars for her WW II service and four stars for her service in Vietnam. The *USS Razorback* also illustrates the importance of the Guppy IIA program that modified submarines to counter the perceived Soviet threat after World War II.

ELABORATION

Although the notions and possibilities of underwater travel were thought of in ancient times by people such as Herodotus, Aristotle, and Pliny the Elder, the first apparent successful submarine voyage did not occur until 1620 with a craft built by Cornelius Drebbel (or Van Drebel, according to some sources).[1] Drebbel used designs drawn in 1578 by William Bourne, a British mathematician and naval writer, and constructed a vessel with a wooden frame and a watertight hull made of greased leather. Propulsion was provided for with twelve oars that extended through the sides, and air was supplied via tubes that were supported on the water's surface by floats.[2] One of the first passengers to ride on Drebbel's vessel was King James I of England who was elated about his voyage to a depth of 15 feet.[3]

By 1727 there were fourteen patents in England alone that had been issued for submarines, including one for a forerunner of the modern ballast tank. It employed goatskin bags that were attached to the hull and also attached to an aperture in the submarine's bottom. As the vessel descended below the water's surface, the bags would take on water. When the vessel was ready to surface, a twisting rod would force the water from the skins.[4]

It would not be until 1775 that the United States would become involved in submarine construction when David Bushnell built a vessel named the *Turtle*. The purpose of the *Turtle* was to get rid of the British

[1] Charles Panati. *Panati's Browser's Book of Beginnings*. Boston: Houghton Mifflin Co., 1984, pp. 321-322.
[2] Commander C. W. Rush, W. C. Chambliss, and H. J. Gimpel. *The Complete Book of Submarines*. Cleveland: The World Publishing Company, 1958, p. 12.
[3] Panati, p.322.
[4] *Ibid.*

blockade of New York harbor.[5] While a student at Yale University, Bushnell became interested in and solved the problem of exploding gunpowder underwater. If gunpowder could be exploded underwater, particularly under a British ship, then the problem of the British Blockade of New York could be potentially solved. As a result, he designed and built the *Turtle* with an oak hull bound with iron bands, and the submarine measured 7½ feet long and 6 feet tall.[6] Although most of the cost of construction was financed by Bushnell, she was also partially funded by the State of Connecticut.[7]

On September 6, 1776, the *Turtle*, piloted by Sgt. Ezra Lee, set out to attack the *H.M.S. Eagle*. Although Lee was not able to fasten the mine to the ship's hull, he released the mine as he withdrew. The subsequent explosion did not damage any of the British ships, but it did frighten them enough to move their ships downstream. Bushnell would try two more attacks later in September, and on October 6 the boat carrying the *Turtle* was sunk. Although the submarine was salvaged, she apparently did not see any more action.[8] Nevertheless, the era of the American submarine was born.

Even though the *Turtle* proved that the use of submarines could be a valuable asset to the Navy, it was not until the early twentieth century that the Navy embraced the idea by announcing specifications for a proposed submarine and inviting bids. The person who would eventually be selected by the Navy was John Holland the head of the Holland Torpedo Boat Company. Holland had been experimenting with submarines for almost twenty-five years, and he thought of a submarine that would go beneath the water's surface using engine power and neutral buoyancy.[9]

Although Holland's company won the Navy's contract for their first submarine, he believed that the Navy's specifications would not result in a satisfactory vessel, and he would be proved correct. The Navy required that the vessel be propelled by a steam engine on the surface and electric motors while submerged. However, the length of time required to extinguish the fire and vent the steam from the boilers of the steam engine prior to diving was unacceptable. In addition, the boat's interior was excruciatingly hot underwater from the residual heat.[10]

Since Holland's first submarine for the Navy proved unacceptable, it was scrapped and another vessel, this time using a gasoline engine for surface propulsion, was constructed. A gasoline engine could be shut down instantly, and transfer to electric propulsion could be accomplished with the flick of a switch. The second

[5] Norman Friedman. *U.S. Submarines Through 1945: An Illustrated Design History*. Annapolis: Naval Institute Press, 1995, p. 11.
[6] Rush, et al., p. 13.
[7] Friedman, *U.S. Submarines Through 1945: An Illustrated Design History*, p. 11.
[8] Friedman, *U.S. Submarines Through 1945: An Illustrated Design History*, pp. 11-12.
[9] Rush, et al., p. 23.
[10] Rush, et al., pp. 23-25.

vessel was much better, and was accepted by the Navy on April 11, 1900. In fact, the vessel was named the *USS Holland* in honor of John Holland, and Holland's company, which eventually became the Electric Boat Division of General Dynamics Corporation, has been the Navy's consistent civilian partner in submarine construction.[11]

After World War I, the Navy began to invest in earnest in submarine development, and their first long-range vessel, the *Argonaut*, was built in 1928. She had a length of 381 feet and a displacement of 2,710 tons, and was the largest non-nuclear submarine ever deployed by the Navy.[12] The *Argonaut* was built specifically as a minelayer, and she was armed with four forward torpedo tubes and could carry sixty mines. The design of the *Argonaut* was the forerunner of the Gato and Balao classes, and employed design features, such as a horizontal cylindrical conning tower, that would become standard on future submarines.[13]

The Gato class represented the state of the art submarine at the beginning of World War II. They were based on the previous Tambor class and incorporated all of the experience gained from the previous classes as well as experience gained during the war. The Gato class became the standard design built during the war, and it was also well-suited to mass production given the fact that it employed a fully welded design. Most of the modifications were internal, and included full air-conditioning and crew comforts that were necessary for long-range Pacific patrols.[14]

Like the Gato class, the Balao class, which included the *USS Razorback*, was an evolutionary submarine design that was based on previous classes, specifically the Gato class. (The term "Balao" is another name for the Halfbeak, a slender marine fish with a protruding lower jaw.) Although many of the improvements in the Balao class were internal, the most significant improvement was the use of higher strength steel (7/8" thick rather than 9/16" thick), which allowed a test depth of 400 feet rather than the Gato class's 300 feet.[15]

The construction of the *USS Razorback* began on September 9, 1943, with the laying of the keel at the Portsmouth Naval Shipyard in Kittery, Maine.[16] (The term "Razorback" is another name for the Rorqual family of whales, which are characterized by throat grooves that extend from the throat to the flippers.) The Portsmouth Naval Shipyard (PNS), which was established in June 1800, is the oldest naval shipyard continuously operated by the U.S. government. The PNS's role in submarine construction began in World

[11] Rush, et al., p. 25.
[12] Panati, pp. 322-323.
[13] Panati, p. 323, and Friedman, p. 178.
[14] Anthony J. Watts. *Allied Submarines*. New York: Arco Publishing Company, Inc., 1977, p. 56.
[15] Friedman, *U.S. Submarines Through 1945: An Illustrated Design History*, p. 208, and Information on Balao class submarines found at: http://encyclopedia.thefreedictionary.com/Balao%20class%20submarine.
[16] Information on the *USS Razorback* (SS-394) found at: http://www.subnet.com/fleet/ss394.htm.

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National Park Service

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Section number 8 Page 4

War I and greatly increased during World War II and the period of the *Razorback's* construction. A total of seventy submarines were built at PNS during World War II and, remarkably, four of them were launched on the same day. PNS remained the Navy's center for the design and development of submarines after World War II up into the nuclear age. The last submarine built in a public shipyard was the nuclear-powered *USS Sand Lance*, launched at PNS in 1969.[17]

By early 1944, the construction of the *Razorback* was far enough along that she was launched on January 27. Her sponsor was Mrs. Henry F.D. Davis, wife of the shipyard's industrial manager. Final construction details were then completed and the *Razorback* was commissioned on April 3, 1944, under the command of Lieutenant Commander Albert M. Bontier. (Bontier would later be killed in action on October 3, 1944, off Morotai Island in Indonesia in the loss of the submarine *USS Seawolf*.)[18]

Once the *Razorback* was commissioned, she underwent shakedown trials off of the New England coast before sailing to Pearl Harbor. Her first war patrol began on August 25 when she sailed west from Pearl Harbor to be a member of an offensive group conducting patrols east of Luzon in the Philippines in support of the mid-September landings on Palau. After the group only sighted enemy antisubmarine planes, the *Razorback* sailed northeastward, arriving at Midway on October 19, 1944.[19]

After a refit period in Midway, the *Razorback* departed on her second war patrol on November 15, 1944, accompanied by the *USS Trepang* (SS-412) and the *USS Segundo* (SS-398). The group of submarines operated in the Luzon Straits where the *Razorback* damaged a 6,933-ton freighter on December 6 and sank an 820-ton destroyer and damaged another freighter on December 30. She returned to Guam for refit, arriving on January 5, 1945.[20]

The *Razorback's* third war patrol began on February 1, 1945, when she set out for the East China Sea, accompanied by the *Segundo* and the *USS Sea Cat* (SS-399). In three separate surface gun actions she sank four wooden ships. After dropping three Japanese prisoners off at Guam, she proceeded to Pearl Harbor where she ended her patrol on March 26, 1945.[21]

On May 7, 1945, the *Razorback* headed west from Pearl Harbor to the Nanpo Shoto and Tokyo Bay areas where she was assigned to lifeguard duty for planes on patrols in the vicinity. While on duty she rescued four B-29 pilots and a fighter pilot before traveling to Midway for refit, arriving there on June 27.[22]

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[17] Information on Portsmouth Naval Shipyard found at: http://www.ports.navy.mil/history.htm.
[18] Information on the *USS Razorback* (SS-394) found at: http://www.subnet.com/fleet/ss394.htm.
[19] *Ibid.*
[20] *Ibid.*
[21] *Ibid.*
[22] *Ibid.*

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The *Razorback's* last World War II patrol, and by far her most illustrious, began on July 22, 1945. She left Midway for patrols in the Russian Sea of Okhotsk, west of the Kamchatka Peninsula, where she sank six wooden cargo sea trucks and damaged two additional ones in a surface gun action. The rest of her patrol in the Kamchatka Peninsula area was spent performing lifeguard services off of Paramushiro Island for Alaska-based planes. However, in August 1945, the *Razorback* sailed south and on August 31 she entered Tokyo Harbor with eleven other submarines to take part in the formal surrender of Japan, which marked the official end of World War II.[23] After the surrender on September 2, she departed Tokyo Bay the following day to head for home, arriving in Pearl Harbor on September 11, and ultimately arriving in San Diego on September 20.[24]

Even after World War II was over, the *Razorback* remained active with the Pacific Fleet. In early 1948 and again in late 1949, she participated in patrols off of Japan and China. However, by 1952 it was time to update the *Razorback* and convert her to a Guppy IIA-type submarine.[25]

In August 1952 the *USS Razorback* was briefly decommissioned and returned to the Portsmouth Naval Shipyard in order to participate in the Greater Underwater Propulsion Power Program (also known as "GUPPY").[26] The Guppy program was initiated by the Navy after World War II in order to improve the submerged speed, maneuverability, and endurance of their submarines, and some of the modifications that the program undertook on the vessels were:

- Addition of a snorkel
- Installation of new batteries
- Expansion of the number of batteries
- Streamlining of the hull
- Removal or redesign of all hull fittings, railings, and deck guns
- Enclosure of the snorkel, periscopes, radar masts, and antennae in a streamlined structure
- Rearrangement of equipment within the submarine
- Installation of new modern Sonar equipment

[23] Of the twelve submarines that were present in Tokyo Bay at the surrender, the *Razorback* is the only surviving operational submarine, and one of two total survivors. The other survivor, the *USS Cavalla* (SS-244) was opened as a museum in Galveston, Texas, in 1971. Information taken from: Jake Sandlin. "Navy vets re-enlist to escort sub home," *Arkansas Democrat-Gazette* 29 August 2004, pp. 1B, 7B.
[24] *Ibid.*
[25] *Ibid.*
[26] *Ibid.*

The Guppy IIA program was important in that it vastly improved the performance of the submarines over their original designs. For example, some Guppy IIA vessels were able to operate at 18 knots underwater, which was a 100% improvement in underwater speed over the original World War II design, and actually faster than the vessel's speed on the surface.[27] The snorkel, battery improvements, and streamlining features were all key elements in the increased performance of the Guppy IIA subs.

The addition of a snorkel was most important since, without a snorkel, submarines had to surface fairly regularly in order to recharge their batteries and refresh their air supply. *R-6*, a submarine manufactured by Lake, tested the first experimental snorkel, a folding model, in 1945 off of New London and Key West. The snorkel was based upon a German snorkel that the U.S. Navy had captured at Toulon, France, in 1944. Subsequently, the General Board specified machinery on later vessels that would allow for the "fitting of engine air supply and exhaust trunk, if developed." Snorkeling was crucial to submarines in order for them to be able to operate in the presence of enemy aircraft, although it was a difficult item to master since if the sea hit the snorkel sideways, it knocked the float valve to one side rather than closing it, which allowed a lot of water to go down the intake.[28]

Operating a submarine on the surface made them much more vulnerable to detection by enemy aircraft. The installation of the snorkel allowed vessels to operate much more efficiently, especially during bad weather or storms. Without a snorkel, a submarine could operate at most 48 hours underwater, while a snorkel essentially made underwater operation unlimited.[29] The *USS Pickerel*, for example, traveled from Hong Kong to Pearl Harbor (a 21-day, 5,194-mile trip) without resurfacing, a record that would stand until nuclear-powered submarines were invented.[30]

The improvement of the batteries on the Guppy IIA-modified submarines was also an important aspect in improving their performance. With respect to the batteries, the ones installed in a World War II fleet submarine could store approximately 1,300 kilowatt hours of energy, which was enough to propel a submerged submarine a distance of 12-15 nautical miles at a top speed of 8.5 knots. Through the Guppy IIA program, the existing 252 batteries, along with some of the machinery, were replaced with 504 batteries of a new type. Although the new batteries were smaller, they could generate a higher amperage for a longer period of time.[31]

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[27] Information on the Guppy program found at: http://www.globalsecurity.org/military/systems/ship/guppy.htm.
[28] Friedman. *U.S. Submarines Through 1945: An Illustrated Design History*, pp. 119, 250, and 252-253.
[29] J. L. Christy. *United States Naval Submarine Force Information Book – 1998*. Marblehead, MA: Graphic Enterprises of Marblehead, 1998, pp. 144-145.
[30] Brayton Harris. *The Navy Times Book of Submarines*. New York: Berkley, 1997, p. 344.
[31] Christy, pp. 40-41, 65, and 144-145.

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Another extremely important aspect of the Guppy program was the streamlining of a submarine's hull, which greatly improved the vessel's overall performance. Streamlining a submarine's hull was accomplished by:

- Removing all deck guns and the associated pressure-tight containers for ready-service ammunition.
- Rebuilding the entire bridge/shears structure as a streamlined "sail" which enclosed the periscopes, the snorkel, the radar masts and the radio and electronic warfare antennae.
- Making the capstans retractable.
- Making all deck cleats retractable.
- Making deck rail stanchion supports insert into the deck.
- Making deck railings removable for diving.
- Removal of the bow towing fairlead.
- Installation of a rounded, streamlined bow, known as a "Guppy Bow."[32]

Prior to streamlining of the hull, the old fleet boat open shears mast support structure contributed to over 50% of the total resistance at high speed. After the streamlining that was done for Guppy-modified and Tang class vessels, the hull form was more efficient than even the German Type XXI vessels.[33] The streamlining innovations developed as part of the Guppy program continue to be used today in modern nuclear-powered submarines.

Some Guppy modifications to submarines also included the installation of fire control systems. Development of a fire control system similar to those used on surface ships began in February 1945. The system had a plotting room in the forward port quarter of the crew's sleeping compartment, which continuously computed and transmitted gun train and elevation to indicators at the guns. A target bearing transmitter on the bridge or periscope measured target bearing while the range was measured by radar. This data along with the target course and own-ship data were input by hand into a Mk 6 computer, which then computed the advance (projected) range, sight angle, and sight deflection. The first submarine to have the system, the *Sea Cat*, completed her training on July 30, 1945.[34]

Specifically, the *Razorback* participated in the Guppy IIA program, which ran from 1952 through 1954. As with the Guppy II program, the Guppy IIA program streamlined the submarine, installed a new sail, a guppy bow, and new motors where they were necessary. The Guppy IIA program, however, went further in that it replaced one forward engine with air-conditioning plants and refrigeration units. The submarine's chill box and freeze boxes were relocated to the forward end of the after battery located under the galley. In addition,

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[32] Christy, p. 66.
[33] Information on Diesel Fast Attack Submarines found at: http://www.geocities.com/Athens/Delphi/9563/t-class.html.
[34] Friedman. *U.S. Submarines Through 1945: An Illustrated Design History*, pp. 119, 250, and 218-219.

submarines that underwent the Guppy IIA modifications had the sonar moved to available space in the forward end of the pump room and some boats had the high-pressure air compressors moved to the lower level of the forward engine room. The only exterior difference between submarines that underwent the Guppy II and Guppy IIA modifications is that the Guppy IIA boats only had three diesel exhaust outlets instead of four.[35] Significantly, the *Razorback* was the only Balao-class submarine in the Guppy program (Including Guppy I, IA, II, IIA, and III) that had her hull reinforced so that she could act as a live target for the MK 35 anti-submarine warfare torpedo then being developed for use by both submarines and surface ships.[36] (The *Razorback* would be modified again with the installation of the Northern Sail at the San Francisco shipyard between December 1961 and February 1962. The design of the Northern sail allowed the bridge to be higher up in the vessel so that it could be manned in rough weather.[37])

The Guppy IIA program was important as a direct response to the rapid buildup of the Soviet submarine fleet after World War II.[38] Due to the expected advances in Russian submarine technology, it was realized that the U.S. fleet would have to be quickly modernized in order to keep up. It was also important that the surface Navy be able to learn how to detect, defend against, and attack, if necessary, the fast Soviet submarines, and an American equivalent would be able to provide that training.

After World War II, the American defense scheme was transformed because of the threat of Soviet bombers merely hours away, and Soviet missiles merely minutes away. (This led to the development of the Strategic Air Command, the Atlas ICBM and, shortly afterwards, the Titan and Minuteman systems.) The U.S. felt that it was essential to develop a maritime solution to the perceived Soviet advantage, which led to a study called Project NOBSKA. The participants in the study recommended the development of a fleet of submarines capable of launching ballistic missiles that would offset the fact that the Soviets had a submarine advantage in terms of numbers.[39]

The Soviet Union made an earlier, more sustained, and technically more sophisticated effort with respect to submarines and missiles. The Soviets created diesel-powered submarines that were able to carry both guided and ballistic missiles. The Soviet Whiskey class submarines, which were introduced into service in 1950, were early examples of diesel-powered guided missile carriers. The Juliett class of submarines, introduced in

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[35] Information on Guppy IIA conversions found at: http://encyclopedia.thefreedictionary.com/GUPPY%20IIA.
[36] A. D. Baker. *U.S. Naval Institute Guide to Combat Fleets of the World, 2002-2003*. Annapolis, MD: US Naval Institute Press, 2002, p. 827.
[37] Sandra Taylor Smith. E-mail to the author. 1 August 2005.
[38] Charles Oldham, ed. *Underway on Nuclear Power: 50th Anniversary of USS Nautilus*. Tampa, FL: Faircount LLC, 2004, p. 19.
[39] Gary E. Weir and Walter J. Boyne. *Rising Tide: The Untold Story of the Russian Submarines that Fought the Cold War*. New York: Basic Books, 2003, p. 184.

1961, was another diesel-powered guided missile boat. The Soviets entered the era of ballistic missile carrying submarines with the introduction of their Project 611, also known as the Zulu class, in 1952, which was the world's first ballistic missile submarine. The success of the class led to the introduction of the Golf class vessels in 1958, which were the first submarines designed from the outset to carry ballistic missiles.[40]

The U.S. also felt threatened by the potential Soviet submarine power, and the estimate of the devastating effect that the Russians would have with their Type XXI boats, especially if they could mass-manufacture them. (The Soviets already had had the largest submarine fleet in the world, with 150 vessels, by 1939.) As a result, the U.S. made anti-submarine warfare a top priority, and they also began to develop the important seafloor Sound Surveillance System (SOSUS),which was an acoustic network meant to gather information on Soviet submarine operations and characteristics. "Thus began a complex international underwater dance, in which the submarine and anti-submarine forces of the West would be pitted against those of the Soviet Union in unending simulated warfare."[41]

The U.S. was also concerned with the potential Soviet submarine threat because they had been able to get a hold of the most advanced German submarine technology by raiding captured German shipyards. Although the U.S. had been successful in submarine warfare against the Japanese in the Pacific, they had tremendous difficulty with anti-submarine warfare against the Germans in the Atlantic. Also, because the U.S. assumed that Soviet nuclear technology was behind their own, they believed that the Soviets would develop a "nuclear torpedo," a remote controlled submarine with an atom bomb on board that could be positioned at a strategic target, during the 1950s.[42]

Although a new class of submarine, the Tang class, which was largely based on captured German technology, was begun in 1949, it was clear early on that it would be too expensive to build the numbers of vessels needed to counter the Soviet threat. The Guppy IIA program was specifically designed to upgrade existing submarines to meet or exceed the abilities of the Tang-class vessels in a more cost effective manner.[43]

The Guppy-modified vessels had the same capabilities of the Tang class vessels, with the exception of the deeper depth capabilities, and were much cheaper to produce. The outcomes of previous Guppy programs were submarines that were not as capable as the Tang class or almost as expensive. The Guppy IIA program made significant changes in several areas of submarine design, the lessons of which are still being felt today.[44]

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[40] *Ibid*, pp. 286-288.
[41] *Ibid*, pp. 26, 35.
[42] *Ibid*, pp. 34-35.
[43] J. L. Christy. *United States Naval Submarine Force Information Book – 1998*. Marblehead, MA: Graphic Enterprises of Marblehead, 1998, pp. 65, 144-145.
[44] *Ibid*.

The Tang class submarine, on the other hand, was a new class of submarine based largely on technology captured from the Germans (the same source as the information the Soviets were using to build their post-war subs). However, only six Tang class submarines were built, since the U.S. realized that it would be too expensive to build the vessels in the large numbers that the U.S. felt it needed.[45] According to Friedman, the Tang-class vessels were the first ones designed specifically to snorkel, and the new design also increased its operating depth from 400 feet to 700 feet.[46]

Both Guppy-modified and Tang-class vessels were important during the Cold War for their roles in anti-submarine warfare. Both programs were a direct response to the perceived Soviet threat, and the need to match or exceed the capabilities of their vessels, which were directly based on the highly-successful World War II German technology. During the first years of the Cold War, the main Cold War naval mission of antisubmarine warfare was a direct response to the fact that it was felt that the Soviets could equal or outperform the German capabilities during the World Wars. Initially, the response to this threat was accomplished through shear numbers of vessels produced, while it was hoped that a new technology would be found, but submarine technology evolved slowly. According to Tom Clancy and John Gresham, "The major bottleneck was in the area of propulsion. Simply put, none of the different propulsion technologies – diesel, hydrogen peroxide, or gasoline – had ever provided the sustained high underwater speeds needed." The American propulsion breakthrough came from U.S. Navy Captain Hyman G. Rickover, who recognized the possibility of creating small nuclear power plants that could be used in ships or submarines.[47]

Due to the improvements in performance that the Guppy IIA program brought about, there was a general program shift in submarine missions and operations. Prior to the Guppy IIA program, submarines were mainly meant to attack and sink surface ships while they themselves were on the surface. However, the Guppy IIA program began a trend in which submarines started specializing almost entirely in submerged anti-submarine warfare.[48] The fact that submarines had speed capabilities along with long-range torpedoes allowed for non-detection by surface ships. The new vessels could carry out direct attacks on enemy submarine bases or barriers (composed of mines or submarines).[49] In addition, the program also resulted in impacts on the development of U.S. anti-submarine warfare weapons, sensors, and tactics. For example, the streamlining of the vessels through the Guppy IIA program resulted in at least a 10% reduction in the submarine's detection range. These improvements forced the Navy to improve existing sensors, such as sonar and radar systems, make faster anti-submarine warfare ships, and develop longer-ranged weapons.[50]

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[45] *Ibid.*
[46] Norman Friedman. *Submarine Design and Development*. Annapolis, MD: Naval Institute Press, 1984, p. 61.
[47] Tom Clancy and John Gresham. *Submarine: A Guided Tour Inside a Nuclear Warship*. New York: Berkley Books, 1993, pp. 9-10.
[48] Brayton Harris. *The Navy Times Book of Submarines*. New York: Berkley, 1997, p. 338.
[49] Norman Friedman. *Submarine Design and Development*, pp. 66-67.
[50] Friedman, *U.S. Submarines Through 1945: An Illustrated Design History*, pp. 40-41, 63.

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In all, thirteen Balao class and four Tench class submarines had the Guppy IIA modifications.[51] However, today, the *USS Razorback* is the last remaining example in the United States, and one of only two remaining examples in the world of a Balao-class submarine with the Guppy IIA modifications. Of the thirteen Balao-class submarines that had the Guppy IIA modifications, the *USS Diodon* (SS-349), *USS Jallao* (SS-368), *USS Menhaden* (SS-377), *USS Bang* (SS-385), *USS Ronquil* (SS-396), and the *USS Picuda* (SS-382) have been scrapped. The *USS Stickleback* (SS-415) was lost in 1958. The *USS Entemedor* (SS-340), *USS Pomfret* (SS-391), *USS Sea Fox* (SS-402), and the *USS Threadfin* (SS-410) served in Turkey until the 1980s or 1990s, and all four vessels have since been scrapped.[52] Finally, the *USS Hardhead* (SS-365) served in Greece until 1993, and is currently in storage at Suda Bay on the island of Crete.[53] The Guppy IIA modifications were completed on the *Razorback* mainly in 1953 and she was recommissioned in January 1954. After being recommissioned, she reported to SubRon 10 (Submarine Squadron 10) at New London, Connecticut, for shakedown and training.[54]

Once her shakedown and training exercises were completed in early 1954, the *Razorback* was transferred to the West Coast where she became a member of SubRon3 (Submarine Squadron 3) based in San Diego on May 24, 1954. For the rest of 1954 and 1955, she was involved in providing antisubmarine training services for local surface and air units. In 1956 her range was extended north to Canada.[55]

On June 24, 1957, the *Razorback* returned to duty in the Far East on her first deployment to that part of the world since the 1940s. She was regularly deployed as part of the 7th Fleet up into the 1960s, and on March 25, 1963, while in Yokosuka, Japan, she received an order from the Commander of Submarine Flotilla Seven that sent her on at least two special operations, one from March 26 through April 1, and one from April 3 through April 7. The deck log pages for the dates are only noted as "Special Operations" and the exact nature of the missions is currently unknown.[56] Her sailing into the South China Sea in 1965 helped her to earn her first Vietnam Service Medal during the deployment. She finished her deployment in 1966 and returned to San Diego on February 1. However, she left again for the western Pacific on December 29, 1966, and returned on July 3, 1967. Her third deployment to the Pacific lasted from August 6, 1968, until February 1969.[57] During her third deployment to the Pacific, the *Razorback* conducted a "mission of great value to the government of the United States." This, along with her involvement in "training and contingency missions"

[51] Information on Guppy IIA submarines found at: http://guppysubmarinetribute.homestead.com/Guppy2A.html.
[52] Greg Zonner. E-mail to Sandra Taylor Smith of the North Little Rock History Commission. 11 April 2005.
[53] Adonakakis, Vagelis (LJG E. Adonakakis, Official in the Hellenic Navy). E-mail to the author. 24 January 2005.
[54] Information on the *USS Razorback* (SS-394) found at: http://www.subnet.com/fleet/ss394.htm.
[55] *Ibid.*
[56] *USS Razorback* Deck Log, 1963, Record Group 24; National Archives and Records Administration – National Archives at College Park.
[57] *Ibid.*

which were conducted in the Gulf of Tonkin area in support of Vietnamese operations led to the *Razorback* receiving her third Vietnam Service Medal.[58]

However, it was not just Vietnam War-related exercises that the *Razorback* participated in during the 1960s; she was involved with several operations related to the Cold War. The *Razorback's* Cold War involvement began in January and February 1957 when she participated in the development of the Rocket-Assisted Torpedo weapons system (later known as the Anti-Submarine Rocket, or ASROC) with the Naval Ordnance Test Station. As a result of her service, she received a Letter of Commendation for her "outstanding performance of duty."[59]

The *Razorback's* Cold War involvement continued and escalated during the 1960s. On May 11, 1962, she participated in the SWORDFISH nuclear weapons test, which was a test of the ASROC weapon system configured with a nuclear depth charge as the warhead. The warhead was launched at a target raft circled by diagnostic devices by the destroyer *Agerholm* (DD-826). The *Razorback*, which had a full crew aboard and was submerged at periscope depth two nautical miles from ground zero, was tossed around by the detonation.[60]

The SWORDFISH test was significant as only one of two nuclear tests of "full up" naval nuclear weapons, or weapons fired from active duty ships under operational conditions. The data that the test generated helped to not only confirm the readiness of the entire weapons system, which included sensors, launcher, and the weapon and warhead, but it was also used to formulate tactical doctrine of the ASROC system. The ASROC system was designed to detect and engage hostile submarines out to a range of five nautical miles. The SWORDFISH test also helped to improve U.S. understanding of the effects of underwater nuclear weapons on both vessels and sensors, which helped to develop tactical doctrine that is still used for submarines today.[61]

After the SWORDFISH test was finished, the *Razorback* continued to work with units of the 1st Fleet in anti-submarine warfare and strike exercises that were "designed to improve the defensive posture of the United

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[58] *USS Razorback* Final Command History, 30 November 1970 – Ship's History Branch, US Naval Historical Center, Washington Navy Yard, Washington, DC, pp. 3-4.
[59] *USS Razorback Command History*, 16 January 1962 – Ship's History Branch, US Naval Historical Center, Washington Navy Yard, Washington, DC.
[60] Information on the Guppy program found at: http://www.globalsecurity.org/military/systems/ship/guppy.htm and information on Pacific nuclear tests found at: http://www.globalsecurity.org/military/systems/ship/guppy.htm.
[61] *Ibid.*

States."[62] She continued to participate in training exercises up through the mid-1960s, including three major exercises with various units of the Pacific Fleet and 1st Fleet in 1966. The *Razorback* also participated in OPERATION WEBFOOT, which was carried out in cooperation with the U.S. Coast Guard and had been designed to test the effectiveness of California's coastal defense against enemy agent infiltration.[63]

The *Razorback* likely participated in her last big test in October 1969 when she participated in Hunter Killer Anti-Submarine Exercise (HUKASWEX) 11-69. Although she received her orders to participate only 48 hours before the exercise began, she was commended for her challenging tactics by the Commander of anti-submarine warfare Group Three and the Commander of anti-submarine warfare forces in the Pacific.[64]

Although the *Razorback* received many commendations for her service in war and other tests and exercises, she received commendations for other activities as well. In July 1963, for example, while returning to the United States from a deployment to the Western Pacific, the *Razorback* rescued Vice Admiral Gerald F. Bogan, USN (ret.) and six others after they were forced to abandon their sinking yacht, *Freedom II*, midway between Hawaii and San Diego.[65] Two crewmen of the *Razorback* received citations from the Secretary of the Navy on another occasion for their actions in 1967 in aiding the rescue and treatment of two crew members from a downed U.S. Navy S-2E aircraft.[66] The *Razorback* was a well-respected member of the Navy's submarine fleet, as evidenced by being selected in 1964 as the Submarine Force, U.S. Pacific Fleet nominee for the Arleigh Burke Trophy, a trophy awarded annually to the most improved ship, submarine, or aviation squadron in each fleet. She was the most improved submarine in the Pacific Fleet, and received congratulations and "well done" from the Commander of the Submarine Force, U.S. Pacific Fleet on August 1, 1964.[67] She would receive several more commendations in 1969 including the coveted Navy "E" for overall excellence, her second award of that type, on July 2, 1969, for being the outstanding submarine of Submarine Division 32, the "Fire Control and Torpedo Performance Award" from the Commander of the Submarine Force, U.S. Pacific Fleet, as the winning submarine of Submarine Division 32's weapons

[62] *USS Razorback* Final Command History, 30 November 1970 – Shop's History Branch, US Naval Historical Center, Washington Navy Yard, Washington, DC, p.5.
[63] *USS Razorback* Command History, 02 February 1967 – Shop's History Branch, US Naval Historical Center, Washington Navy Yard, Washington, DC, pp. 1-2.
[64] *USS Razorback* Command History, 28 May 1970 – Ship's History Branch, US Naval Historical Center, Washington Navy Yard, Washington, DC, pp. 1,4.
[65] *USS Razorback* Final Command History, 30 November 1970 – Ship's History Branch, US Naval Historical Center, Washington Navy Yard, Washington, DC, p. 5.
[66] *USS Razorback* Command History, 02 February 1967 – Ship's History Branch, US Naval Historical Center, Washington Navy Yard, Washington, DC, p. 4.
[67] *USS Razorback* Final Command History, 30 November 1970 – Ship's History Branch, US Naval Historical Center, Washington Navy Yard, Washington, DC, p. 6.

readiness competition, and an overall mark of "outstanding" from the Commander of Submarine Squadron 3 after her annual command inspection in December 1969.[68]

Even though the *Razorback* was first and foremost a vessel meant to be used for protection and a weapon of war, she also fulfilled the role of goodwill ambassador during the 1960s. In July 1962, she participated in Seattle, Washington's, "Sea Fair," a fair that highlights the traditions, celebrations, and diversity of the Puget Sound area, and hosted 5,000 visitors during the event.[69] From June through August 1966, she served as the official host ship for BAP *Dos de Mayo* (S-41), a submarine from the Peruvian Navy, during her visit to San Diego, California. The *Razorback* provided significant material and professional assistance to *Dos de Mayo*, resulting in improved cooperation and goodwill between the U.S. and Peru.[70] Finally, in 1969, she hosted 3,575 visitors during the Portland, Oregon, Rose Festival as a representative of the Submarine Force, U.S. Pacific Fleet.[71]

During the remainder of 1969 and into January 1970, the *Razorback* operated on the West Coast, based in San Diego, California. However, on January 30, 1970, she left on her final deployment, again to the western Pacific, which lasted until August 7. On November 30, 1970, the *Razorback* was decommissioned at the Hunter's Point Naval Shipyard. At the same time that she was struck from the Navy List, the *Razorback* was transferred to the Turkish Navy and recommissioned as the *TCG Murat Reis* (S-336).[72] The submarine was named after Murat Reis, a famous admiral in the sixteenth-century Ottoman Navy who was best known for his work in the Indian seas in 1552 and 1553.[73]

The transfer of a submarine from the U.S. Navy to the Turkish Navy was not a new phenomenon when the *Razorback* was transferred in 1970. After World War II and the Truman Doctrine, Turkey was one of the nations to which the U.S. decided to give military aid. After the Turks and Americans met in Turkey for talks in 1947, it was decided that, among other things, four submarines would be transferred to the Turkish Navy. The Turkish crews came to the U.S. on February 20, 1948, and after two months of training, the *USS Blueback*, *USS Boarfish*, *USS Chub*, and the *USS Brill* left for Turkey on April 19. They were commissioned

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[68] *USS Razorback* Command History, 28 May 1970 – Ship's History Branch, US Naval Historical Center, Washington Navy Yard, Washington, DC, pp. 1,4.
[69] *USS Razorback* Command History, 07 January 1963 – Ship's History Branch, US Naval Historical Center, Washington Navy Yard, Washington, DC.
[70] *USS Razorback* Command History, 02 February 1967 – Ship's History Branch, US Naval Historical Center, Washington Navy Yard, Washington, DC, p. 4.
[71] *USS Razorback* Command History, 28 May 1970 – Ship's History Branch, US Naval Historical Center, Washington Navy Yard, Washington, DC, p. 1.
[72] *Ibid.* "TCG" stands for Turkiye Cumhuriyeti Gemisi, which means Ship of the Turkish Republic.
[73] Captain Alaettin Sevim, Naval Attaché in the Turkish Embassy Defense Attaché Office and last Commander of the *TCG Murat Reis*. E-mail to the author 31 August 2004. and information on Turkish Naval policy found at: http://www.ozturkler.com/data_english/0003/0003_12_10.htm.

in Turkey on May 23, 1948, as the *TCG 2.Inonu*, *TCG Sakarya*, *TCG Gur*, and the *TCG 1.Inonu*, respectively. Additional transfers of submarines also occurred in the 1950s and 1960s.[74]

Although the *Razorback* was decommissioned and transferred to Turkey on November 30, 1970, she spent the time until October 1971 being overhauled at Hunter's Point Naval Shipyard. She sailed for Turkey shortly afterwards, arriving there on November 17, 1971, and was commissioned one month later.[75]

Initially, the *Murat Reis* was assigned to Submarine Division One, which had its homeport in the City of Eregli on the Black Sea coast. However, after the collapse of the Warsaw Pact in 1991, she was reassigned to the City of Golcuk on the coast of the Sea of Marmara with the rest of Submarine Division One. She remained stationed there until her decommissioning.[76]

Due to the secret and classified nature of the Turkish submarine operations, little information is available about the *Murat Reis'* duties while in the Turkish Navy. However, it is known that she conducted forty-one patrols and exercises during wartime operations and international crises, including active involvement in the Cyprus Peace Operation in 1974. She fired a total of fifty-six warheads and training torpedoes, which earned her the title of the "most successful submarine in torpedo attack" in 1991.[77]

After thirty years of service in the Turkish Navy as the *TCG Murat Reis*, she was decommissioned in August 2001.[78] Although Turkey had thought about scrapping the *Razorback*, the intervention of submarine veterans groups and the City of North Little Rock brought about 2½ years of negotiations between U.S. and Turkish officials that ultimately led to the sale of the submarine to the City of North Little Rock for $37,000 in 2004.[79] On March 25, 2004, in a ceremony at the Turkish Naval Shipyard in Golcuk, Turkey, Mayor Patrick Hays accepted transfer of title for the *Razorback* in front of Turkish and U.S. Embassy dignitaries.[80]

Once the *Razorback* was transferred to the City of North Little Rock, the long process of bringing the vessel to Arkansas began. From Golcuk, Turkey, the vessel traveled a short distance to a commercial shipyard in Tuzla where approximately five weeks worth of work were performed in order to prepare her for towing

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[74] Information on the History of Turkish Submarines during the Years of American Military Aid (1948-1972) found at: http://www.turkishnavy.net/submarine/hist3.htm.

[75] *Ibid.*

[76] Captain Alaettin Sevim, Naval Attaché in the Turkish Embassy Defense Attaché Office and last Commander of the *TCG Murat Reis*. E-mail to the author 31 August 2004.

[77] *Ibid.*

[78] Jake Sandlin. "NLR sub docks in New Orleans," *Arkansas Democrat-Gazette*. 20 June 2004, pp. 1B, 3B.

[79] "Arrival of USS Razorback submarine delayed," *Arkansas Democrat-Gazette*. 11 July 2004, p. 1B, and Taylor Smith, Sandra. Telephone conversation with the author. 13 August 2004.

[80] Jake Sandlin. "NLR's naval museum takes shape Mayor given title to submarine; Navy picks city to receive tugboat," Arkansas *Democrat-Gazette*. 26 March 2004, found at: http://www.northlr.org/maritime-museum/news-clips/3.26.04/default.asp.

across the Atlantic, including removing the batteries.[81] In early May all was ready, and the *Razorback* left Istanbul on May 5, 2004, beginning its long journey to Arkansas.[82] Just over one month later, on June 13, the *Razorback* finally made it back to American soil, making an overnight pit stop in Key West, Florida, for some light maintenance.[83]

The *Razorback* left Key West on June 14 en route to New Orleans where additional maintenance and preparations were scheduled before the submarine's last leg of the journey up the Mississippi and Arkansas rivers. She arrived in New Orleans on June 19, 2004, and more maintenance along with a fresh paint job was completed.[84] In addition, she was changed from being pulled by an ocean-going tow vessel to being placed between two barges for the remainder of the trip.[85]

By July 3, 2004, the *Razorback* had begun the journey from New Orleans to its final destination in North Little Rock. The vessel was due to participate in the dedication of the Montgomery Point Lock and Dam at the mouth of the Arkansas River on July 16, before arriving in North Little Rock on July 18. Although she was able to make it to Montgomery Point, the arrival in North Little Rock was delayed due to the low water levels in the Arkansas River. At some places the river was only nine feet deep, and the submarine was drafting approximately fifteen feet. As a result, the *Razorback* was moored at Rosedale, Mississippi, until the problem could be solved.[86]

The initial plan to raise the *Razorback* involved emptying the ballast tanks of water and old fuel, and also removing approximately 300 lead bricks. However, it only raised her approximately a foot. Success was finally achieved by submerging two barges alongside her, sliding lifting bridles underneath the submarine, and then raising the barges, which also raised the *Razorback*. Once it was raised to a good level, it remained in place in Rosedale to make sure it would remain stable.[87]

On approximately August 1, the *Razorback* was finally ready to head up the Arkansas River under the guidance of the towboat *Brother Wilson*, a trip that would take approximately thirty hours. Finally, at approximately 2:30 p.m. on August 3, she arrived at the Port of Little Rock. A broom attached to the top of

[81] "Turkey sub headed for repairs," *North Little Rock Times*. 18 March 2004, found at: http://www.northlr.org/maritime-museum/news-clips/3.18.04/default.asp.
[82] "Arrival of USS Razorback submarine delayed," *Arkansas Democrat-Gazette*. 11 July 2004, p. 1B.
[83] Timothy O'Hara. "History lies below decks," *Key West Citizen*. 12 June 2004, found at: http://www.northlr.org/maritime-museum/news-clips/06.12.04/default.asp.
[84] Jake Sandlin. "NLR sub docks in New Orleans," *Arkansas Democrat-Gazette*. 20 June 2004, pp. 1B, 3B.
[85] Jake Sandlin. "Historical sub 'junk' handled with care," *Arkansas Democrat-Gazette*. 22 June 2004, pp. 1B, 3B.
[86] "Arrival of USS Razorback submarine delayed," *Arkansas Democrat-Gazette*. 11 July 2004, p. 1B.
[87] Stephen Deere. "Sub's end of voyage in sight, Hays says," *Arkansas Democrat-Gazette*. 22 July 2004, pp. 1B, 4B.

the submarine, bristles up, signaled "mission accomplished," a tradition that dated from World War II. After a trip of almost three months and 6,500 miles the *USS Razorback* had finally arrived at its final destination.[88]

After a public homecoming celebration for the *Razorback* on August 29, 2004, it is planned that the submarine will be one of the centerpieces of the proposed $15 million Arkansas Inland Maritime Museum (AIMM), which will be located on the banks of the Arkansas River in downtown North Little Rock. The anticipated arrival of the *USS Hoga* (NHL designation 06/30/89) in the near future will also be a major event for the proposed museum. The museum will allow many people from around the country and around the world to learn more about America's maritime past.

The preservation of the *USS Razorback* represents a monumental achievement of the City of North Little Rock and the various submarine veterans organizations that have been involved for the past several years in acquiring the vessel from Turkey and then getting it North Little Rock. The *Razorback* is significant as the longest serving submarine in the world at the time of her decommissioning in Turkey in 2001, and as the last operational submarine that was present in Tokyo Bay on September 2, 1945, to take part in the formal surrender of Japan.

However, the *Razorback* is even more significant as the last remaining example of a Balao class submarine that underwent Guppy IIA modifications, and it represents a very rare and significant type of submarine. The Guppy IIA program had been specifically designed to cost-effectively upgrade existing submarines to meet or exceed the capabilities of the Tang-class vessels and the Guppy IIA program made significant changes in several areas of submarine design, the lessons of which are still being felt today. In addition, due to the improvements in performance that the Guppy IIA program brought about, there was a general program shift in U.S. submarine missions and operations. Prior to the Guppy IIA program, submarines were mainly meant to attack and sink surface ships while they themselves were on the surface. However, the Guppy IIA program began a trend in which submarines started specializing almost entirely in submerged anti-submarine warfare.

The significance of the *USS Razorback* as a Guppy IIA-modified Balao class submarine is reinforced when compared to other submarines that have been listed on the National Register or designated National Historic Landmarks. For example, the *USS Becuna* (NR listed 08/29/78, NHL 01/14/86) underwent Guppy IA modifications in 1951, while the *USS Clamagore* (NR listed and NHL 06/29/86) underwent Guppy II modifications in 1947 and Guppy III modifications in 1962.[89] The other Balao class submarines listed on the

[88] Van Jensen. "Razorback ends latest 'adventure' at LR Port," *Arkansas Democrat-Gazette*. 4 August 2004, pp. 1A, 12A.
[89] Casper J. Knight, Sr. "*USS Becuna* #319." National Register of Historic Places Inventory – Nomination Form. From the files of the Pennsylvania Historical and Museum Commission, 1978, and James P. Delgado. "*USS Clamagore* (SS-343)." National Historic Landmark Nomination. From the National Historic Landmark files, Washington, DC, 1988.

National Register and designated NHLs, the *USS Bowfin* (NR listed 11/16/82, NHL 01/14/86), *USS Lionfish* (NR listed 09/30/76, NHL 01/14/86), and the *USS Pampanito* (NR listed and NHL 01/14/86), all reflect their original World War II configurations.[90]

STATEMENT OF SIGNIFICANCE

The *USS Razorback* is being nominated to the National Register of Historic Places under **Criterion C** with **national significance** as an excellent example of a Balao class submarine with Guppy IIA modifications. Of the thirteen Balao class submarines that underwent Guppy IIA modifications between 1952 and 1954, the *USS Razorback* is the last remaining example in the United States, and one of two remaining examples in the world. The *USS Razorback* is also being nominated to the National Register under **Criterion A** for her role in U.S. maritime and military history. Having served in the U.S. and Turkish navies from her commissioning in April 1944 until she was decommissioned in August 2001, the *USS Razorback* was the longest-serving submarine in the world at the time of her decommissioning. In addition, the *USS Razorback* is the last operational submarine that was present in Tokyo Bay on September 2, 1945, to take part in the formal surrender of Japan, which officially ended World War II. During its distinguished U.S. military career, the *USS Razorback* earned five battle stars for her WW II service and four stars for her service in Vietnam. The *USS Razorback* also illustrates the importance of the Guppy IIA program that modified submarines to counter the perceived Soviet threat after World War II.

[90] Thomas J. Hartey. "*U.S.S. Bowfin* (SS 287)." National Register of Historic Places Inventory – Nomination Form. From the files of the State Historic Preservation Division of the Hawaii Department of Land and Natural Resources, 1982, and information on the *USS Pampanito* and *USS Lionfish* from National Park Service's National Maritime Initiative found at: http://www.cr.nps.gov/history/online_books/butowsky1/pampanito.htm and http://www.cr.nps.gov/history/online_books/butowsky1/lionfish.htm.

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10. Geographical Data

Acreage of Property Less than one.

UTM References
(Place additional UTM references on a continuation sheet.)

	Zone	Easting	Northing		Zone	Easting	Northing
1	15	567389	3845772	3			
2				4			

☐ See continuation sheet

Verbal Boundary Description
(Describe the boundaries of the property on a continuation sheet.)

Boundary Justification
(Explain why the boundaries were selected on a continuation sheet.)

11. Form Prepared By

name/title Ralph S. Wilcox, National Register & Survey Coordinator
organization Arkansas Historic Preservation Program date April 14, 2005
street & number 1500 Tower Building, 323 Center Street telephone (501) 324-9787
city or town Little Rock state AR zip code 72201

Additional Documentation

Submit the following items with the completed form:

Continuation Sheets

Maps

A **USGS map** (7.5 or 15 minute series) indicating the property's location

A **Sketch map** for historic districts and properties having large acreage or numerous resources.

Photographs

Representative **black and white photographs** of the property.

Additional items
(Check with the SHPO or FPO for any additional items.)

Property Owner

(Complete this item at the request of SHPO or FPO.)

name City of North Little Rock
street & number 120 Main Street, PO Box 936 telephone (501) 975-8888
city or town North Little Rock state AR zip code 72115-0936

United States Department of the Interior
National Park Service

National Register of Historic Places Continuation Sheet

Section number 10 Page 1

VERBAL BOUNDARY DESCRIPTION

The *USS Razorback* is moored on the north bank of the Arkansas River in the vicinity of the I-30 Bridge at the future site of the Arkansas Inland Maritime Museum (UTM: 15/567389/3845772).

BOUNDARY JUSTIFICATION

The boundary encompasses the entire area of the *USS Razorback*.

NPS Form 10-900a
(Aug. 2002)

OMB Approval No. 1024—0018
(Expires Jan. 2005)

United States Department of the Interior
National Park Service

National Register of Historic Places Continuation Sheet

Section number _____ Page _____

SUPPLEMENTARY LISTING RECORD

NRIS Reference Number: 04001502 Date of Listing: September 1, 2005

Property Name: *USS Razorback* (SS-394)

County: Pulaski State: Arkansas

N/A
Multiple Name

This property is listed in the National Register of Historic Places in accordance with the attached nomination documentation subject to the following exceptions, exclusions, or amendments, notwithstanding the National Park Service certification included in the nomination documentation.

for Daniel J. Vivian
Signature of the Keeper

September 1, 2005
Date of Action

==========

Amended Items in Nomination:

Section 10. Geographical Data
The verbal boundary justification is hereby revised to read as follows: "All that area encompassed within the extreme length and breadth of the vessel."

The boundary justification is hereby revised to read as follows: "The boundary incorporates the entire area of the vessel as she lays at her berth."

The Arkansas State Historic Preservation Office was notified of this amendment.

DISTRIBUTION:
National Register property file
Nominating Authority (without nomination attachment)

NPS Form 10-900a
(Aug. 2002)

OMB Approval No. 1024—0018
(Expires Jan. 2005)

United States Department of the Interior
National Park Service

National Register of Historic Places Continuation Sheet

Section number _____ Page _____

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DISTRIBUTION:
National Register property file
Nominating Authority (without nomination attachment)

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

NATIONAL REGISTER OF HISTORIC PLACES
EVALUATION/RETURN SHEET

REQUESTED ACTION: RESUBMISSION

PROPERTY NAME: USS RAZORBACK (SS-394)

MULTIPLE NAME:

STATE & COUNTY: ARKANSAS, Pulaski

DATE RECEIVED: 8/05/05 DATE OF PENDING LIST:
DATE OF 16TH DAY: DATE OF 45TH DAY: 9/18/05
DATE OF WEEKLY LIST:

REFERENCE NUMBER: 04001502

DETAILED EVALUATION:

___ACCEPT ___RETURN ___REJECT _____DATE

ABSTRACT/SUMMARY COMMENTS:

The *USS Razorback* (SS-394) is nationally significant under Criterion A for its role in military and maritime history and under Criterion C, as an example of a Balao-class submarine with Guppy IIA modifications. Commissioned in April 1944, the *Razorback* saw action in World War II and was present at the formal surrender of Japan in Tokyo Bay on September 2, 1945. It is the last surviving Balao-class submarine of the thirteen that underwent Guppy IIA modifications between 1952 and 1954. The engineering modifications carried out during this program reflect the critical role of submarine operations in the early stages of the Cold War. Today, the *Razorback* illustrates the importance played by the Guppy IIA program in U.S. naval operations and retains integrity from its period of significance.

RECOM./CRITERIA Accept A&C
REVIEWER Daniel Vivian DISCIPLINE Historian
TELEPHONE (202) 354-2252 DATE 9/1/05
DOCUMENTATION see attached comments Y/N see attached SLR (Y)/N

The Department of
Arkansas
Heritage

Mike Huckabee, Governor
Cathie Matthews, Director

Arkansas Arts Council

Arkansas Natural Heritage Commission

Delta Cultural Center

Historic Arkansas Museum

Mosaic Templars Cultural Center

Old State House Museum

Arkansas Historic Preservation Program

1500 Tower Building
323 Center Street
Little Rock, AR 72201
(501) 324-9880
fax: (501) 324-9184
tdd: (501) 324-9811
e-mail:
info@arkansaspreservation.org
website:
www.arkansaspreservation.org

An Equal Opportunity Employer

August 4, 2005

Dr. Janet Matthews
Chief of Registration
United States Department of the Interior
National Register of Historic Places
National Park Service
8th Floor
1201 Eye Street, NW
Washington, DC 20005

RE: *USS Razorback (SS-394)* – North Little Rock, Pulaski County, Arkansas

Dear Dr. Matthews:

We are enclosing for your review the above-referenced revised nomination. The Arkansas Historic Preservation Program has complied with all applicable nominating procedures and notification requirements in the nomination process.

If you need further information, please call Ralph S. Wilcox of my staff at (501) 324-9787. Thank you for your cooperation in this matter.

Sincerely,

Cathie Matthews

Cathie Matthews
State Historic Preservation Officer

CM:rsw

Enclosure


394

USS RAZORBACK

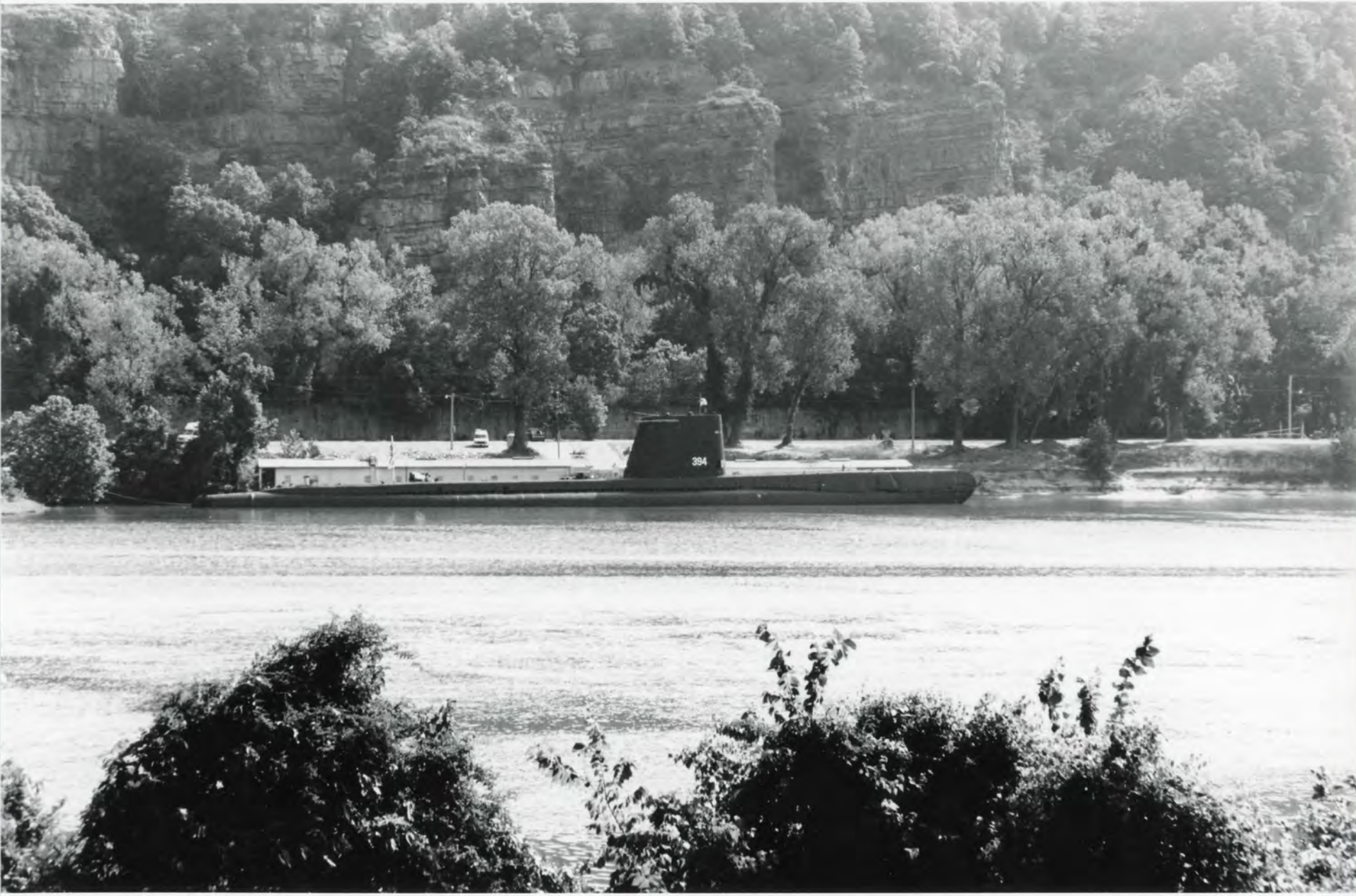
PULASKI COUNTY, AR

SARAH JAMPOLE

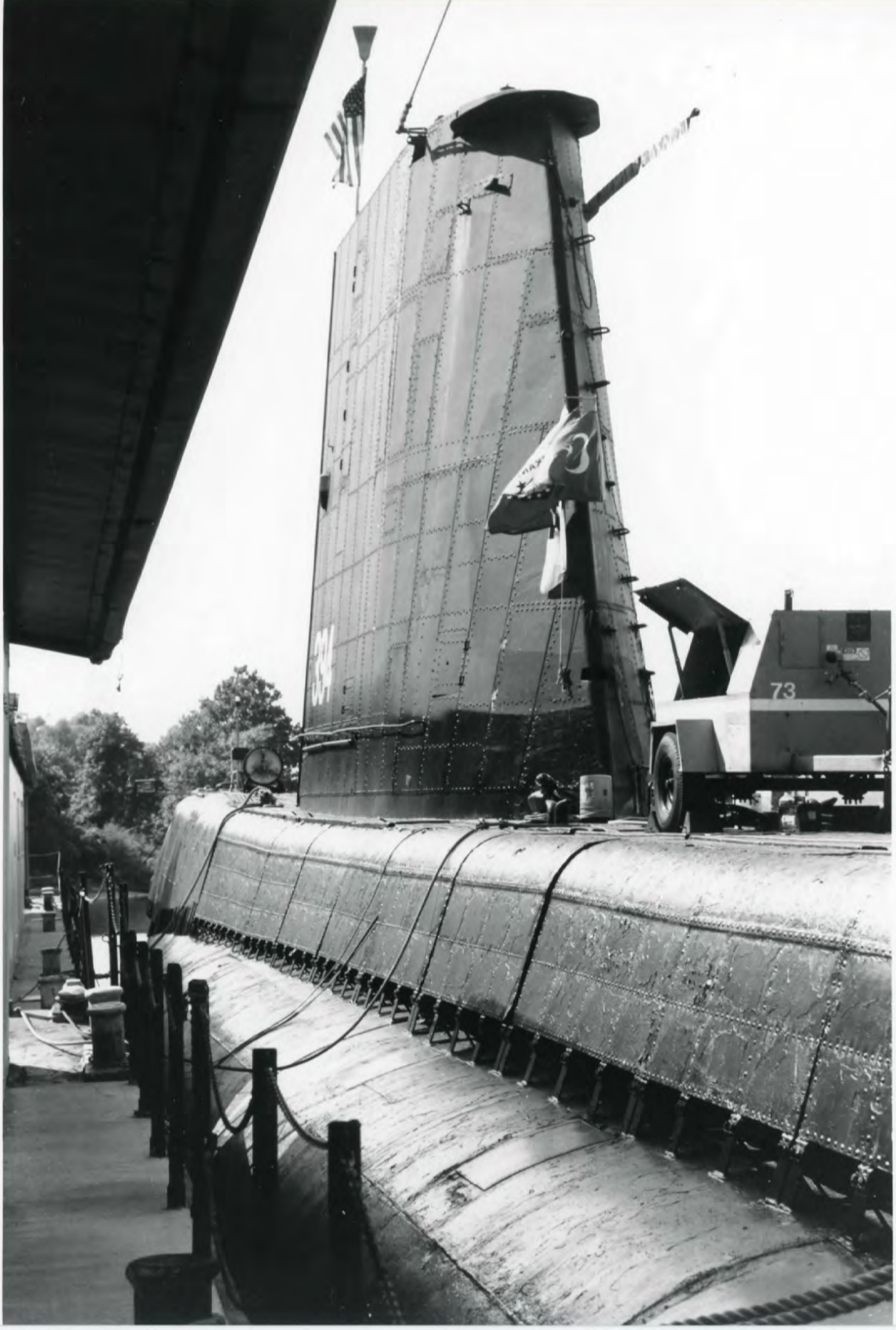
AUGUST 2004

ARKANSAS HISTORIC PRESERVATION PROGRAM, LITTLE ROCK, AR

SIDE VIEW (WITH BARGES IN THE FOREGROUND)


394

USS RAZORBACK
PULASKI COUNTY, AR
SARAH JAMPOLE
AUGUST 2004
ARKANSAS HISTORIC PRESERVATION PROGRAM, LITTLE ROCK, AR
SIDE VIEW


73

USS RAZORBACK
PULASKI COUNTY, AR
SARAH JAMPOLE
AUGUST 2004
ARKANSAS HISTORIC PRESERVATION PROGRAM, LITTLE ROCK, AR
VIEW OF THE SAIL, LOOKING FORWARD

USS RAZORBACK

PULASKI COUNTY, AR

SARAH JAMPOLE

AUGUST 2004

ARKANSAS HISTORIC PRESERVATION PROGRAM, LITTLE ROCK, AR

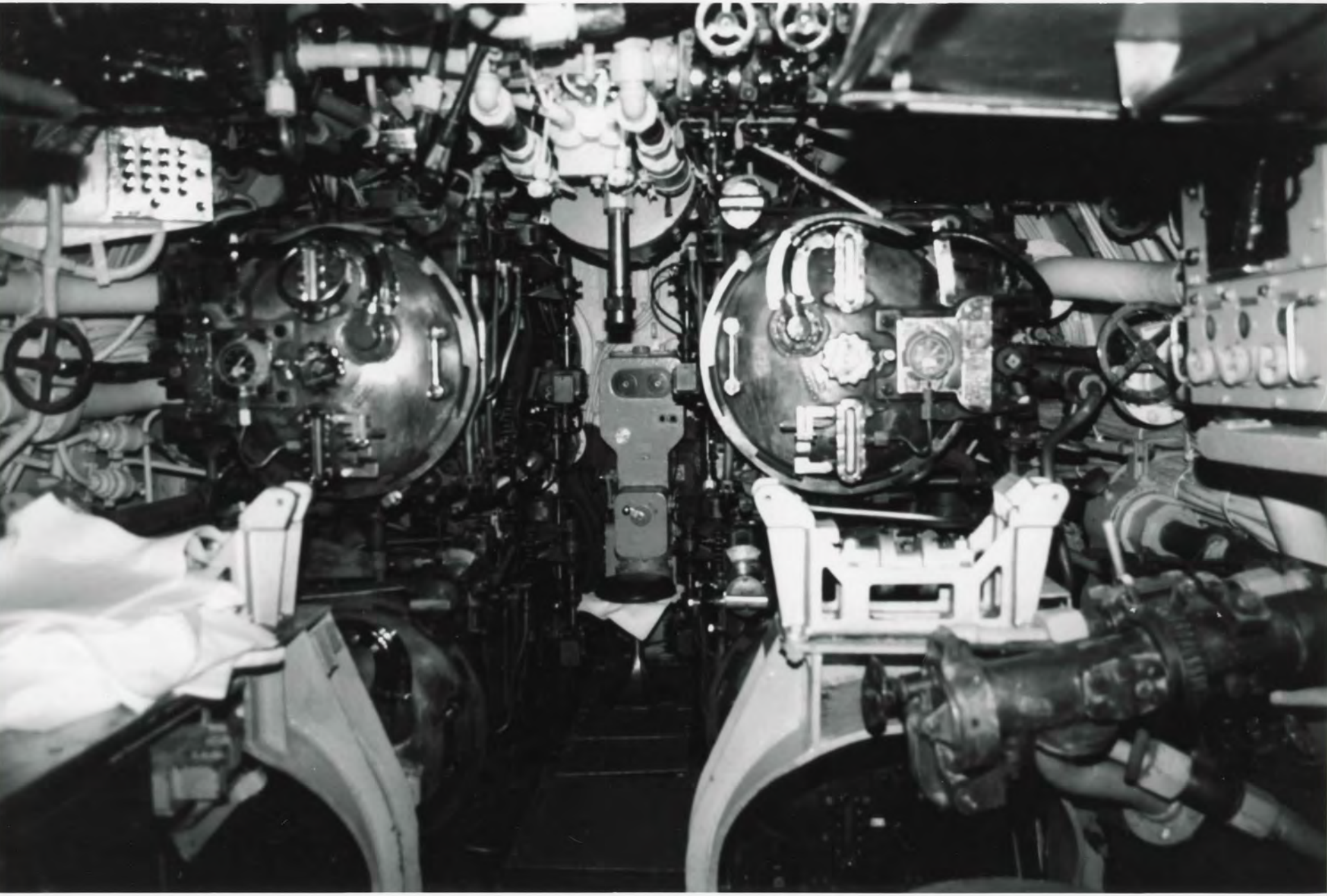
VIEW LOOKING FORWARD

USS RAZORBACK
PULASKI COUNTY, AR
SARAH JAMPOLE
AUGUST 2004
ARKANSAS HISTORIC PRESERVATION PROGRAM, LITTLE ROCK, AR
VIEW OF THE DECK, LOOKING FORWARD


A B SOD

USS RAZORBACK
PULASKI COUNTY, AR
SARAH JAMPOLE
AUGUST 2004
ARKANSAS HISTORIC PRESERVATION PROGRAM, LITTLE ROCK, AR
VIEW OF THE DECK, LOOKING AFT

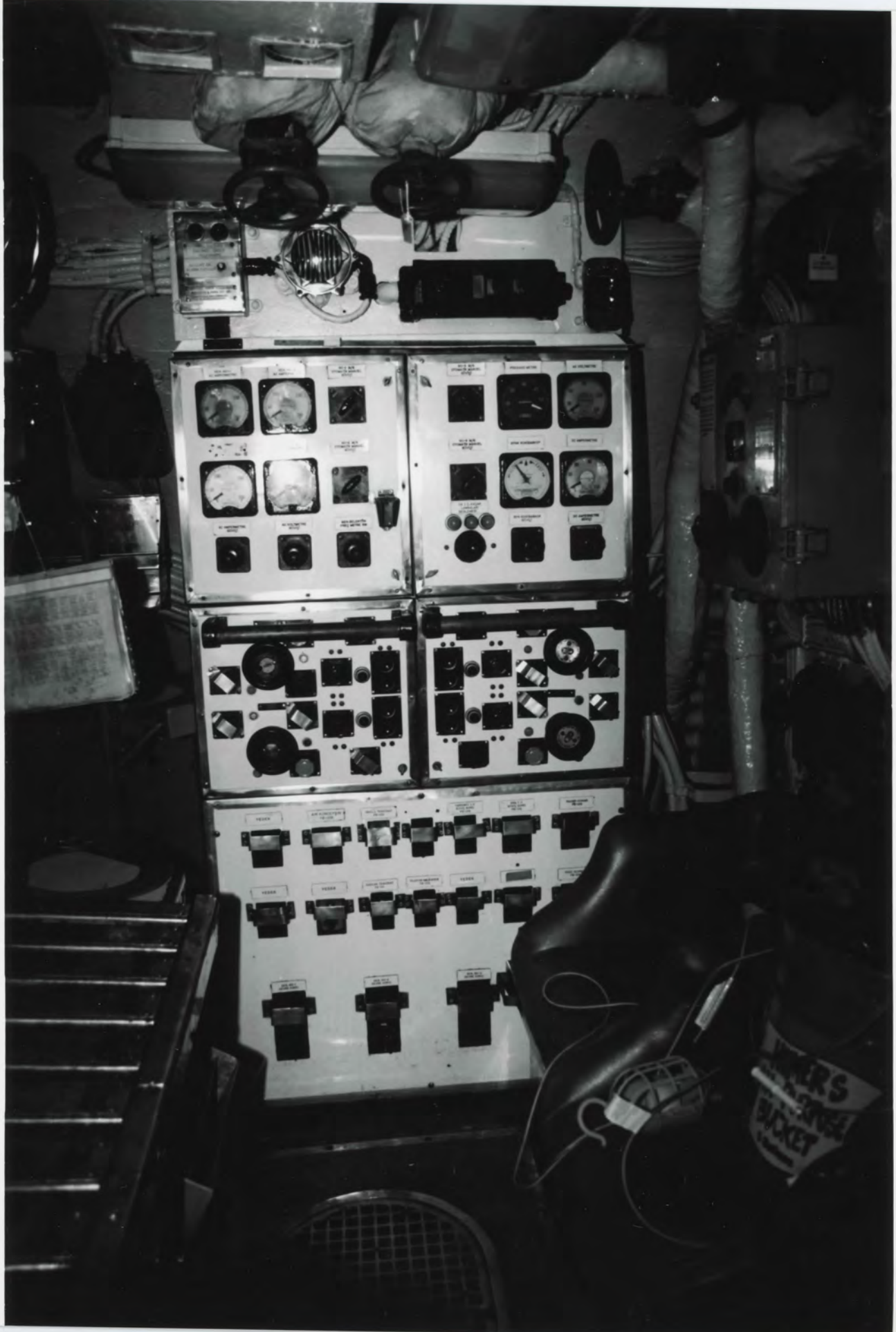
USS RAZORBACK
POLASKI COUNTY, AR
SARAH JAMPOLE
AUGUST 2004
ARKANSAS HISTORIC PRESERVATION PROGRAM, LITTLE ROCK, AR
VIEW OF THE CREW'S BUNKS



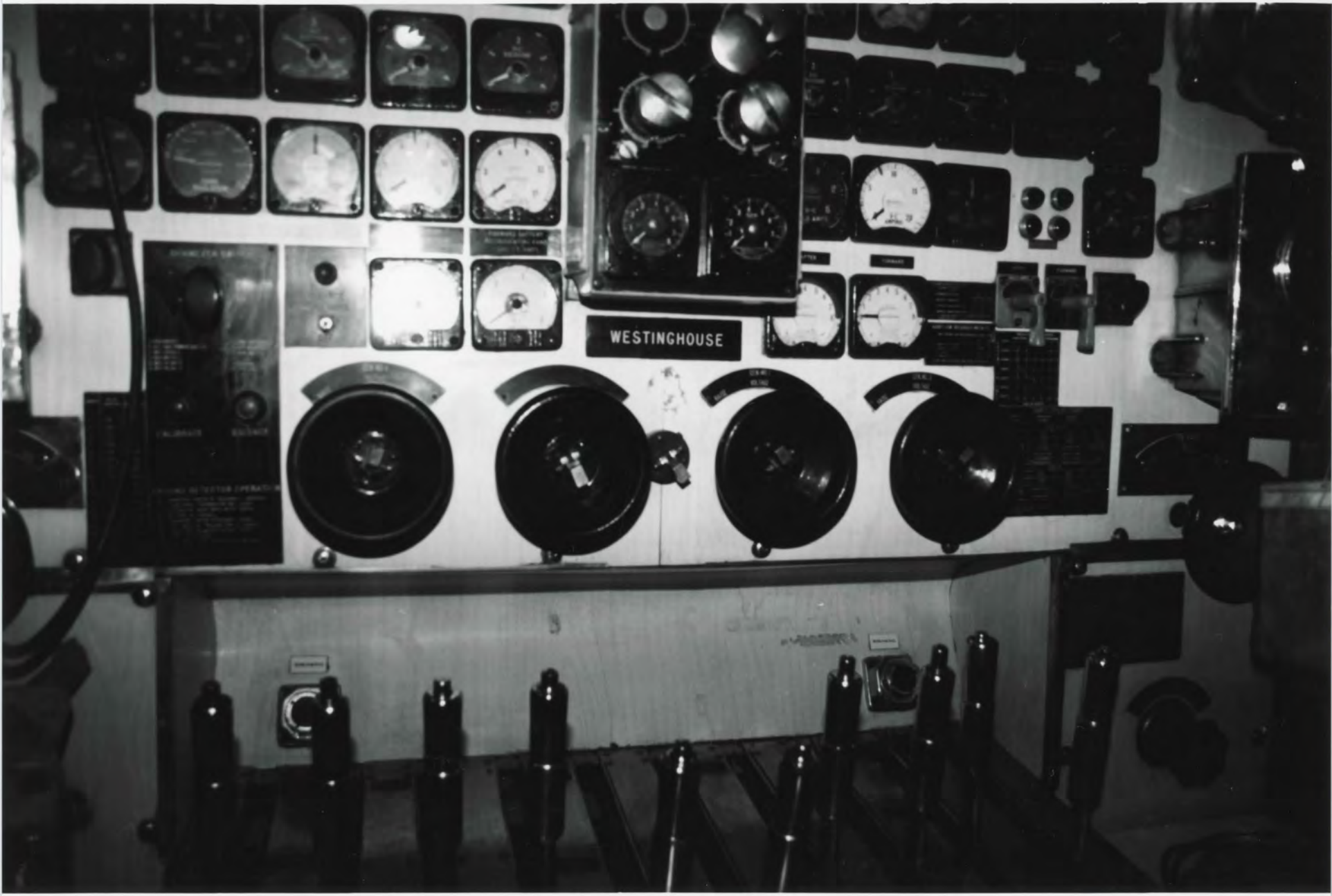
USS RAZORBACK
PULASKI COUNTY, AR
SARAH JAMPOLE
AUGUST 2004
ARKANSAS HISTORIC PRESERVATION PROGRAM, LITTLE ROCK, AR
VIEW OF THE AFT TORPEDO ROOM


KAPALI

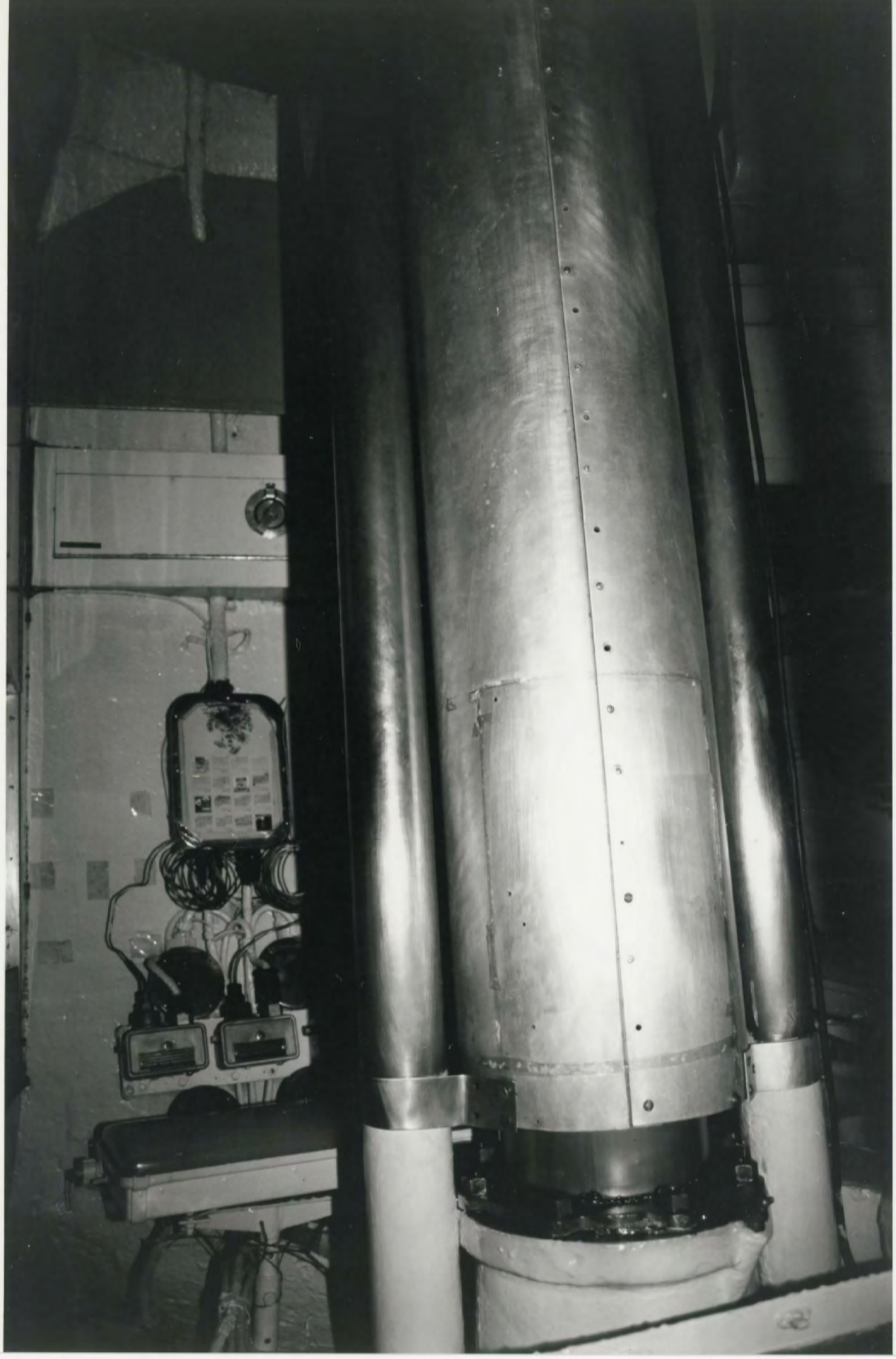
USS RAZORBACK
PULASKI COUNTY, AR
SARAH JAMPOLE
AUGUST 2004
ARKANSAS HISTORIC PRESERVATION PROGRAM, LITTLE ROCK, AR
VIEW OF AN OFFICER'S QUARTERS.



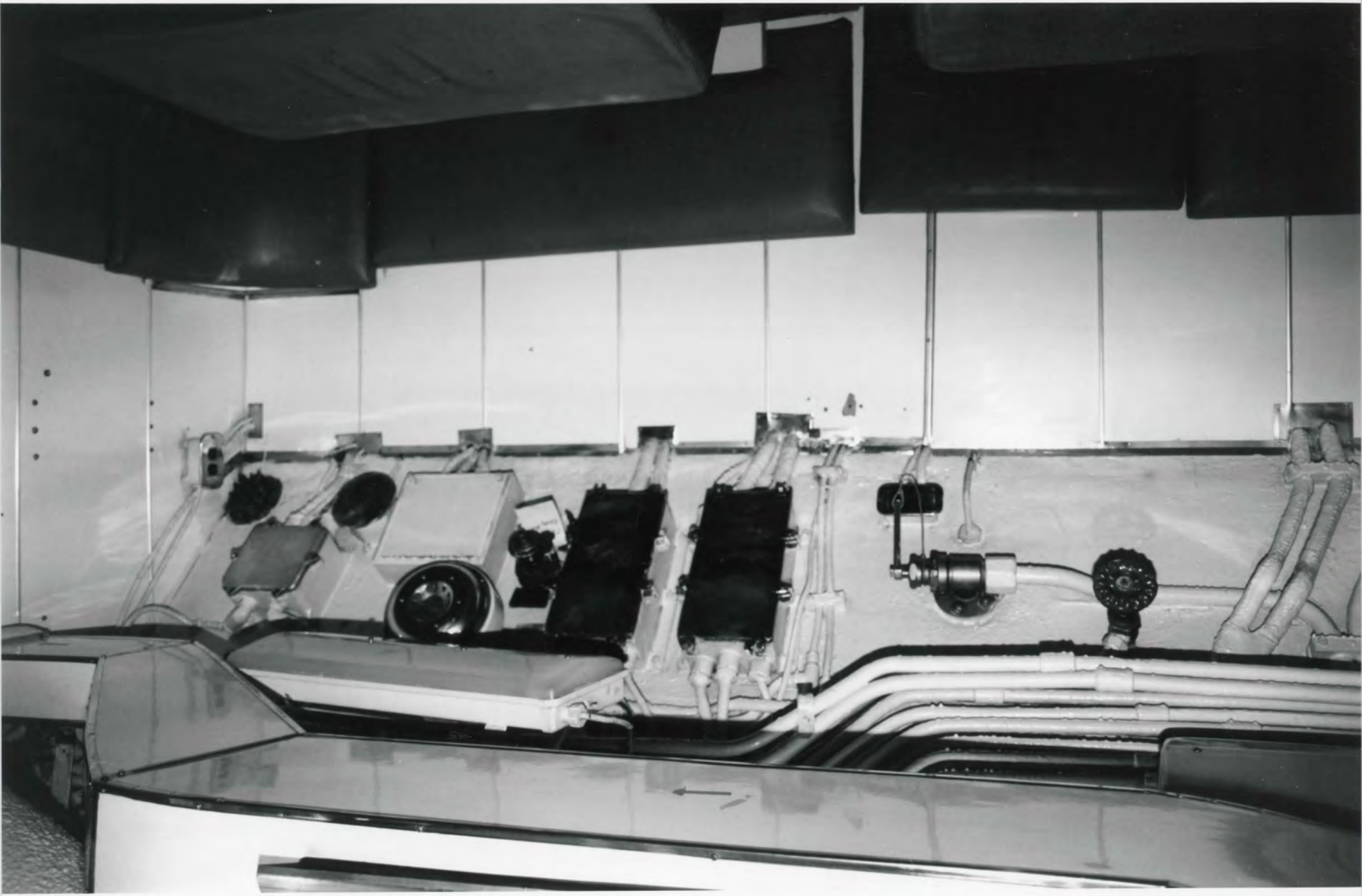
USS RAZORBACK
PULASKI COUNTY, AR
SARAH JAMPOLE
AUGUST 2004
ARKANSAS HISTORIC PRESERVATION PROGRAM, LITTLE ROCK, AR
VIEW OF THE MANEUVERING ROOM


WESTINGHOUSE

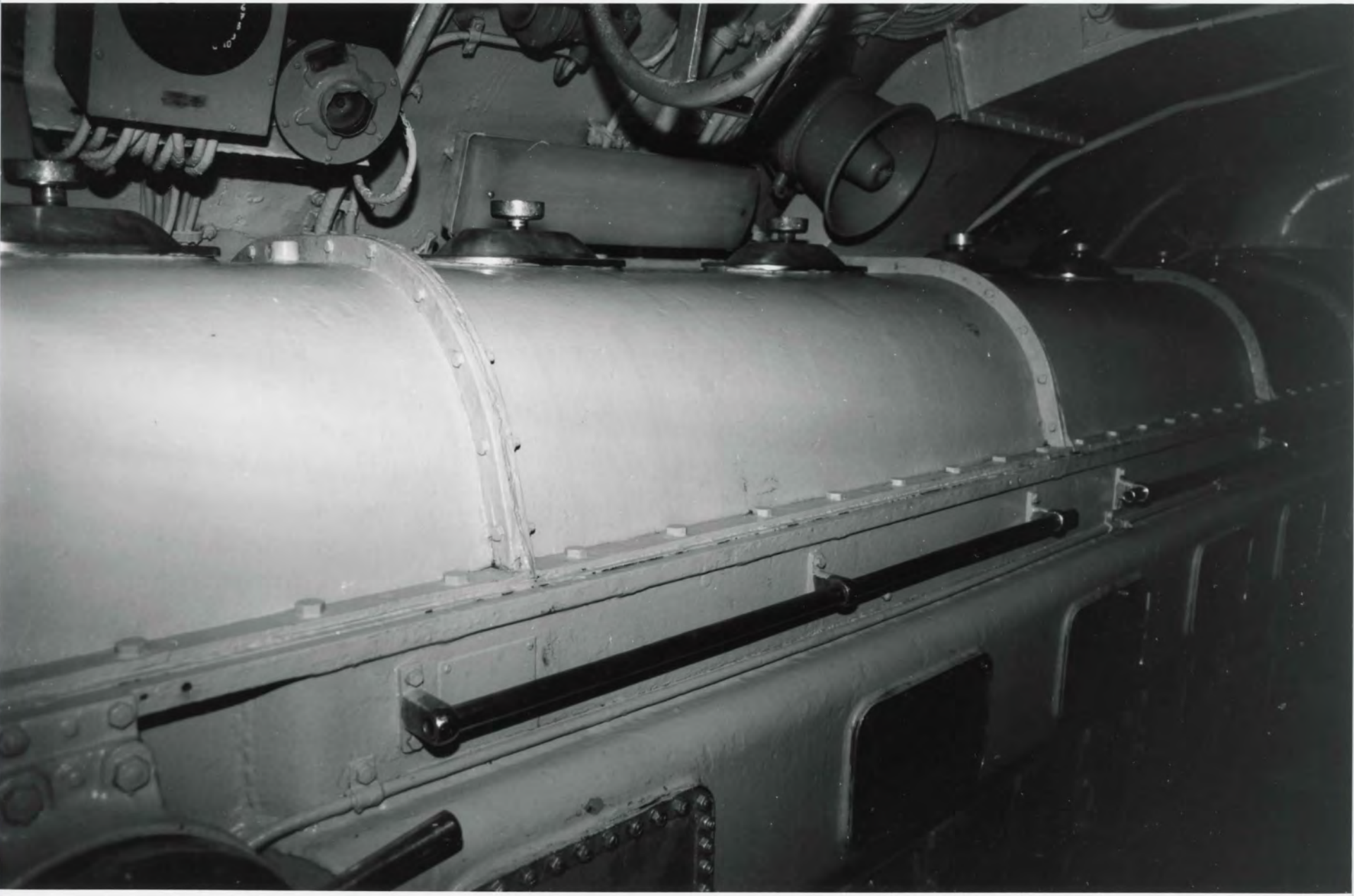
USS RAZORBACK
PULASKI COUNTY, AR
SARAH JAMPOLE
AUGUST 2004
ARKANSAS HISTORIC PRESERVATION PROGRAM, LITTLE ROCK, AR
VIEW OF THE MANEUVERING ROOM



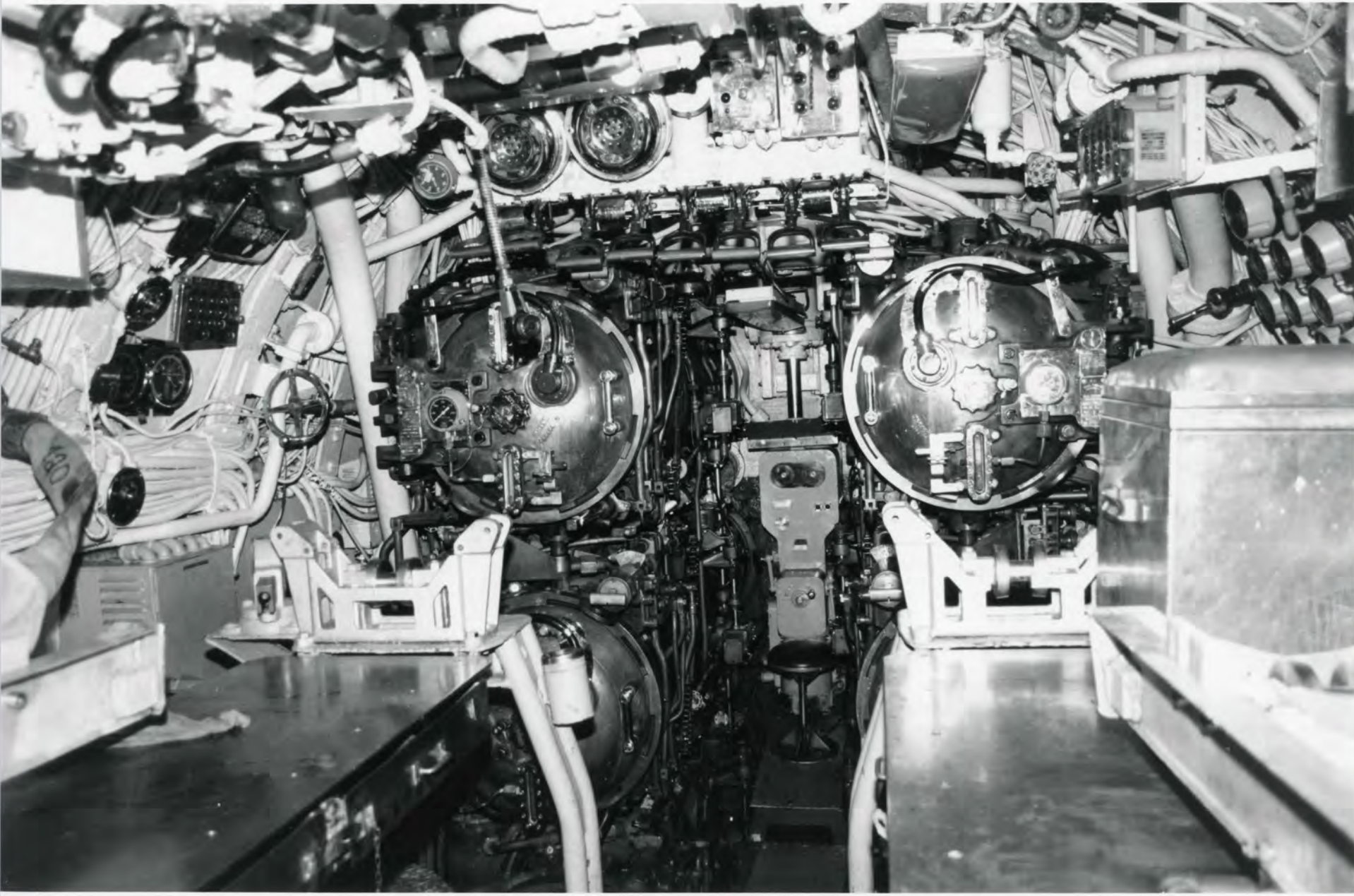
USS RAZORBACK
PULASKI COUNTY, AR
SARAH JAMPOLE
AUGUST 2004
ARKANSAS HISTORIC PRESERVATION PROGRAM, LITTLE ROCK, AR
VIEW OF THE PERISCOPE



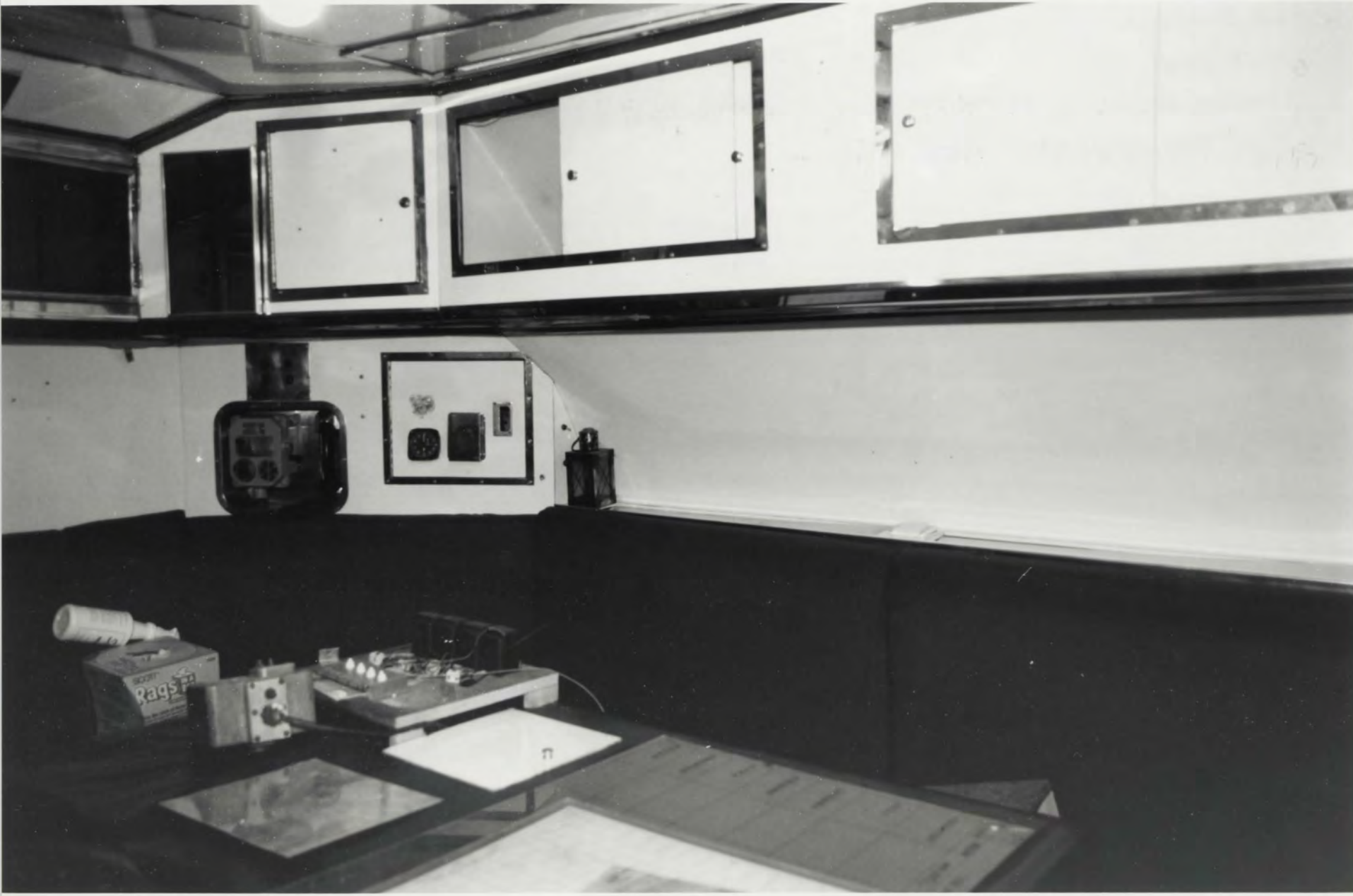
USS RAZORBACK
PULASKI COUNTY, AR
SARAH JAMPOLE
AUGUST 2004
ARKANSAS HISTORIC PRESERVATION PROGRAM, LITTLE ROCK, AR
VIEW OF THE CREW'S MESS HALL



USS RAZORBACK
PULASKI COUNTY, AR
SARAH JAMPOLE
AUGUST 2004
ARKANSAS HISTORIC PRESERVATION PROGRAM, LITTLE ROCK, AR
VIEW OF THE ENGINE ROOM

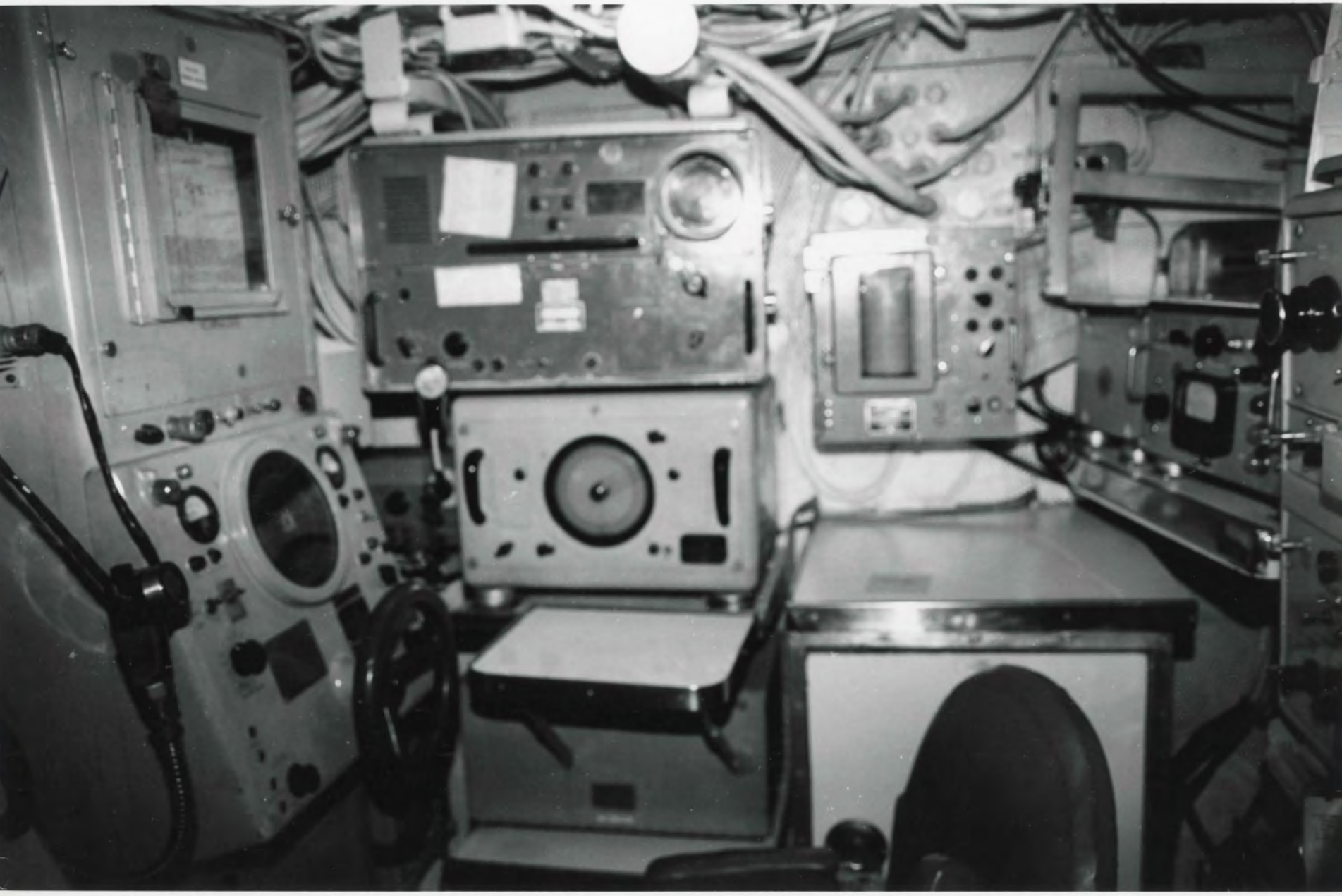


USS RAZORBACK
PULASKI COUNTY, AR
SARAH JAMPOLE
AUGUST 2004
ARKANSAS HISTORIC PRESERVATION PROGRAM, LITTLE ROCK, AR
VIEW OF THE FORWARD TORPEDO ROOM


Bags

USS RAZORBACK
PULASKI COUNTY, AR
SARAH JAMPOLE
AUGUST 2004
ARKANSAS HISTORIC PRESERVATION PROGRAM, LITTLE ROCK, AR
VIEW OF THE OFFICERS' MESS HALL

USS RAZORBACK
PULASKI COUNTY, AR
SARAH JAMPOLE
AUGUST 2004
ARKANSAS HISTORIC PRESERVATION PROGRAM, LITTLE ROCK, AR
VIEW OF THE RADIO ROOM



USS RAZORBACK
PULASKI COUNTY, AR
SARAH JAMPOLE
AUGUST 2004
ARKANSAS HISTORIC PRESERVATION PROGRAM, LITTLE ROCK, AR
VIEW OF THE SONAR ROOM

USS RAZORBACK
PULASKI COUNTY, AR
SARAH JAMPOLE
AUGUST 2004
ARKANSAS HISTORIC PRESERVATION PROGRAM, LITTLE ROCK, AR
VIEW OF THE CONNING TOWER

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

NORTH LITTLE ROCK QUADRANGLE
ARKANSAS–PULASKI CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

7552 IV NW (MAYFLOWER) | 7553 IV NE (CATO) | 7553 I NW (OLMSTEAD)

92°22′30″ | 34°52′30″ | 92°15′ | 34°45′

1 920 000 FEET | 800 000 FEET | 760 000 FEET | 1 890 000 FEET

R. 13 W. | R. 12 W. | 20′

T. 3 N. | T. 2 N. | T. 1 N.

7553 IV SW (PINNACLE MOUNTAIN) | 7553 I SW (MC ALMONT)

CAMP JOSEPH T ROBINSON (ARKANSAS NATIONAL GUARD)

PURDHAM HILL

BURNS PARK

MURRAY LAKE

Rosenbaum Lake

Engineers Lake

ARKANSAS RIVER

DAVID D TERRY LAKE

LITTLE ROCK

NORTH LITTLE ROCK

CAMMACK VILLAGE

PULASKI HEIGHTS

LEVY

PARK HILL

JEFFREY

MARCHE

OAK GROVE

Blue Hill

Round Hill

Pulaski

Haig

Amboy

Sewage Disposal

Boat Ramp

Golf Course

Water Tank

Water Tanks

Optimist Park

NORTH LITTLE ROCK MUNICIPAL AIRPORT

Produced by the United States Geological Survey

Derived from imagery taken 1984 and other sources. Photoinspected using imagery taken 1996; no major culture or drainage changes observed. PLSS and survey control current as of 1985
Boundaries, other than corporate, verified 1999

North American Datum of 1983 (NAD 83). Projection and 10 000-foot ticks: Arkansas coordinate system, south zone (Lambert conformal conic)
1000-meter Universal Transverse Mercator grid, zone 15

North American Datum of 1983 (NAD 83) is shown by dashed corner ticks. The values of the shift between NAD 27 and NAD 83 for 7.5-minute intersections are obtainable from National Geodetic Survey NADCON software

There may be private inholdings within the boundaries of the National or State reservations shown on this map

UTM GRID AND 1999 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

CONTOUR INTERVAL 10 FEET
DOTTED LINES REPRESENT 5-FOOT CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929
TO CONVERT FROM FEET TO METERS, MULTIPLY BY 0.3048

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U.S. GEOLOGICAL SURVEY, P.O. BOX 25286, DENVER, COLORADO 80225
AND ARKANSAS GEOLOGICAL COMMISSION, LITTLE ROCK, ARKANSAS 72204
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

QUADRANGLE LOCATION

ROAD CLASSIFICATION
Primary highway, hard surface
Secondary highway, hard surface
Light-duty road, hard or improved surface
Unimproved road
Interstate Route | U.S. Route | State Route

INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—1999

USS RAZORBACK
NORTH LITTLE ROCK,
PULASKI COUNTY, AR
UTM:
15/567389/3845772
T. 2 N.

NORTH LITTLE ROCK, ARK.

1996

NIMA 7553 IV SE–SERIES V884

ISBN 0-607-91063-1

(ALEXANDER) 7553 III NW | (LITTLE ROCK) 7553 III NE | (SWEET HOME) 7553 II NW