

**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 National Register Bulletin, *How to Complete the National Register of Historic Places Registration Form*. If any 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.

1. Name of Property

Historic name: DIXIE ARROW, shipwreck and remains

Other names/site number: _____

Name of related multiple property listing:

World War II Shipwrecks along the East Coast and Gulf of Mexico

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

2. Location

Street & number: Not Applicable

City or town: Not Applicable State: Offshore: NC County: Offshore: Dare

Not For Publication: Vicinity:

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 forth 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 at the following level(s) of significance:

X national statewide local

Applicable National Register Criteria:

X A B C X D

<p>_____</p> <p>Signature of certifying official/Title:</p> <p>_____</p> <p>State or Federal agency/bureau or Tribal Government</p>	<p>_____</p> <p>Date</p>
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DIXIE ARROW, shipwreck and remains
Name of Property

Offshore: Dare County, NC
County and State

In my opinion, the property ___ meets ___ does not meet the National Register criteria.	
<hr/>	<hr/>
Signature of commenting official:	Date
<hr/>	<hr/>
Title :	State or Federal agency/bureau or Tribal Government

4. National Park Service Certification

I hereby certify that this property is:

- ___ entered in the National Register
- ___ determined eligible for the National Register
- ___ determined not eligible for the National Register
- ___ removed from the National Register
- ___ other (explain:) _____

Signature of the Keeper	Date of Action
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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

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Site	<input checked="" type="checkbox"/>
Structure	<input type="checkbox"/>
Object	<input type="checkbox"/>

Number of Resources within Property

(Do not include previously listed resources in the count)

Contributing	Noncontributing	
_____	_____	buildings
<u>1</u>	_____	sites
_____	_____	structures
_____	_____	objects
<u>1</u>	_____	Total

Number of contributing resources previously listed in the National Register 1

6. Function or Use

Historic Functions

(Enter categories from instructions.)

TRANSPORTATION-WATER RELATED

Current Functions

(Enter categories from instructions.)

VACANT/NOT IN USE

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7. Description

Architectural Classification

(Enter categories from instructions.)

N/A

Materials: (enter categories from instructions.)

Principal exterior materials of the property: N/A

Narrative Description

(Describe the historic and current physical appearance and condition of the property. Describe contributing and noncontributing resources if applicable. Begin with a **summary paragraph** that briefly describes the general characteristics of the property, such as its location, type, style, method of construction, setting, size, and significant features. Indicate whether the property has historic integrity.)

Summary Paragraph

See Continuation Sheets

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Narrative Description

See Continuation Sheets

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County and State

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.)

- A. Owned by a religious institution or used for religious purposes
- B. Removed from its original location
- C. A birthplace or grave
- D. A cemetery
- E. A reconstructed building, object, or structure
- F. A commemorative property
- G. Less than 50 years old or achieving significance within the past 50 years

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Areas of Significance

(Enter categories from instructions.)

DEFENSE-battle site

COMMERCE

MARITIME HISTORY

ENGINEERING

ARCHITECTURE

ARCHAEOLOGY-HISTORIC

Period of Significance

1921-1942

Significant Dates

11/1921 (launch)

3/26/1942 (sinking)

Significant Person

(Complete only if Criterion B is marked above.)

Cultural Affiliation

N/A

Architect/Builder

New York Shipbuilding Corp. Camden, NJ (builder)

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Statement of Significance Summary Paragraph (Provide a summary paragraph that includes level of significance, applicable criteria, justification for the period of significance, and any applicable criteria considerations.)

See Continuation Sheets

Narrative Statement of Significance (Provide at least **one** paragraph for each area of significance.)

See Continuation Sheets

9. Major Bibliographical References

Bibliography (Cite the books, articles, and other sources used in preparing this form.)

See 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 # _____
- recorded by Historic American Landscape Survey # _____

Primary location of additional data:

- State Historic Preservation Office
- Other State agency
- Federal agency
- Local government
- University
- Other

Name of repository: NOAA/Office of National Marine Sanctuaries

Historic Resources Survey Number (if assigned): _____

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10. Geographical Data

Acreege of Property 61.77635

Use either the UTM system or latitude/longitude coordinates

Latitude/Longitude Coordinates

Datum if other than WGS84: _____

(enter coordinates to 6 decimal places)

- 1. Latitude: _____ Longitude: _____
- 2. Latitude: _____ Longitude: _____
- 3. Latitude: _____ Longitude: _____
- 4. Latitude: _____ Longitude: _____

Or

UTM References

Datum (indicated on USGS map):

NAD 1927 or NAD 1983

- 1. Zone: 18 Easting: 431180 Northing: 3862470
- 2. Zone: 18 Easting: 431680 Northing: 3862470
- 3. Zone: 18 Easting: 431180 Northing: 3861970
- 4. Zone: 18 Easting : 431680 Northing: 3861970

Verbal Boundary Description (Describe the boundaries of the property.)

The DIXIE ARROW rests offshore of Cape Hatteras, North Carolina at a depth of 90 feet. The vessel's remains lie in United States' federal waters off the coast of North Carolina outside the boundary of NOAA's Monitor National Marine Sanctuary. UTM coordinates for the DIXIE ARROW, shipwreck and remains are 3862220 North 431430 East. This location marks the center of the property. The 61.77635 acre site (a square 500 meters per side with boundary coordinates: northwest 3862470 N x 431180 E, northeast 3862470 N x 431680 E, southwest 3861970 N x 431180 E, southeast 3861970 N x 431680 E) includes the main hull structure and debris field surrounding the tanker.

Boundary Justification (Explain why the boundaries were selected.)

The National Register boundaries of the DIXIE ARROW shipwreck encompass the footprint of its articulated remains within a square (500 meters per side) to capture debris and artifacts that are separated from the main structure. Archaeological surveys conducted by NOAA's Office of National Marine

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Sanctuaries revealed the extents of the centralized structure surrounded by scattered debris set apart from the main structure.

11. Form Prepared By

name/title: Deborah Marx, Maritime Archaeologist and James Delgado, Ph.D., Director of Maritime Heritage

organization: NOAA/Office of National Marine Sanctuaries

street & number: 1305 East West Hwy Building: SSMC4

city or town: Silver Spring state: MD zip code: 20910

e-mail Deborah.Marx@noaa.gov

telephone: 781-545-8026 ex 214

date: 7/15/2013

Additional Documentation

Submit the following items with the completed form:

- **Maps:** A **USGS map** or equivalent (7.5 or 15 minute series) indicating the property's location.
- **Sketch map** for historic districts and properties having large acreage or numerous resources. Key all photographs to this map.
- **Additional items:** (Check with the SHPO, TPO, or FPO for any additional items.)

Photographs

Submit clear and descriptive photographs. The size of each image must be 1600x1200 pixels (minimum), 3000x2000 preferred, at 300 ppi (pixels per inch) or larger. Key all photographs to the sketch map. Each photograph must be numbered and that number must correspond to the photograph number on the photo log.

Photo Log

Name of Property: DIXIE ARROW, shipwreck and remains

City or Vicinity: not applicable

County: Offshore-Dare State: NC

Photographer: United States Coast Guard

Date Photographed: unknown

Description of Photograph(s) and number: Photo Number: DIXIE ARROW_0001

DIXIE ARROW, port side profile view.

Image Source: Mobile Shipping Company. *Mobile Book of Ships: A Century At Sea* by Arthur Gordon, 1991.

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Name of Property: DIXIE ARROW, shipwreck and remains

City or Vicinity: not applicable

County: Offshore-Dare State: NC

DIXIE ARROW, shipwreck and remains

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Photographer: United States Navy

Date Photographed: 26 March 1942

Description of Photograph(s) and number: Photo Number: DIXIE ARROW_0002

DIXIE ARROW engulfed in flames prior to sinking.

Image Source: National Archives, 1941-1945 US Navy Tenth Fleet: ASW Analysis and Stat Section

Series XIII. Report and Analysis of US and Allied Merchant Shipping Losses 1941-194:

DELAES – EAGLE. RG 38 Box 221. National Archives, Washington, DC.

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Name of Property: DIXIE ARROW, shipwreck and remains

City or Vicinity: not applicable

County: Offshore-Dare

State: NC

Photographer: National Oceanic and Atmospheric Administration (NOAA)

Date Photographed: 2011

Description of Photograph(s) and number: Photo Number: DIXIE ARROW_0003

DIXIE ARROW's boilers and lower hull remains.

Image Source: NOAA/Monitor National Marine Sanctuary

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Name of Property: DIXIE ARROW, shipwreck and remains

City or Vicinity: not applicable

County: Offshore-Dare

State: NC

Photographer: National Oceanic and Atmospheric Administration (NOAA)

Date Photographed: 2011

Description of Photograph(s) and number: Photo Number: DIXIE ARROW_0004

DIXIE ARROW's engine, side view.

Image Source: NOAA/Monitor National Marine Sanctuary

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Name of Property: DIXIE ARROW, shipwreck and remains

City or Vicinity: not applicable

County: Offshore-Dare

State: NC

Photographer: National Oceanic and Atmospheric Administration (NOAA)

Date Photographed: 2011

Description of Photograph(s) and number: Photo Number: DIXIE ARROW_0005

DIXIE ARROW's engine, top view.

Image Source: NOAA/Monitor National Marine Sanctuary

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Paperwork Reduction Act Statement: This information is being collected for applications to the National Register of Historic Places to nominate properties for listing or determine eligibility for listing, to list properties, and to amend existing listings. Response to this request is required to obtain a benefit in accordance with the National Historic Preservation Act, as amended (16 U.S.C.460 et seq.).

Estimated Burden Statement: Public reporting burden for this form is estimated to average 100 hours per response including time for reviewing instructions, gathering and maintaining data, and completing and reviewing the form. Direct comments regarding this burden estimate or any aspect of this form to the Office of Planning and Performance Management, U.S. Dept. of the Interior, 1849 C. Street, NW, Washington, DC.

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Section 7 – Narrative Description

SUMMARY

DIXIE ARROW is a sunken wreck site that is comprised of the remains of a steel hulled American tanker carrying a cargo of crude oil that sank on 26 March 1942 as a result of German U-boat activities off the United States coast during World War II. DIXIE ARROW was the fifty-eighth Allied merchant vessel sunk off the American coast during Germany’s Operation Drumbeat. The shipwreck lies in 90 feet of water fifteen miles off Cape Hatteras, North Carolina. DIXIE ARROW’s extant remains consist of its hull which sits upright on its keel. The vessel is contiguous from its stern all the way to its bow with the highest relief in the bow section where the forward tanks are located. Its engine, boilers, and associated machinery are in place as well as its rudder and propeller.

SETTING

DIXIE ARROW lies partially buried on a flat sand plain on the continental shelf southeast of the Cape Hatteras, North Carolina. The ocean seafloor is comprised of sand with only a slight slop to the southeast. The shipwreck lies near the western margin of the Gulf Stream making it subject to changes in current velocity and direction. The DIXIE ARROW has taken on an ecosystem role as hard substrate for encrusting invertebrates as well as a variety of fish and shark species. The shipwreck is now home to a diverse array of marine life from sharks and sponges to rays.

DIXIE ARROW sits within an area that was one of the main operating zones of German U-boat’s Operation Drumbeat during World War II. It lies amongst 61 other shipwrecks and 4 U-boats off North Carolina all sunk during the Battle of the [Western] Atlantic between 1942 and 1945. These wrecks comprise, collectively, an underwater battlefield for one of the most decisive naval engagements of World War II in American waters, which was part of the larger “Battle of the Atlantic.” This clash pitted German U-boats against merchant vessels trading with the United States during the war. The ships involved in the battle included U.S.-flagged as well as foreign-flagged vessels, all engaged in transporting the industrial and mineral output of the United States in a time when the U.S. was engaged in the global conflict of 1939-1945. The ships sunk in that confrontation, like DIXIE ARROW, are part of the collective record of the battle and its participants, both warship and merchant vessel.

DESCRIPTION

The following description of the DIXIE ARROW’s archaeological remains is based on diver surveys conducted by NOAA’s Office of National Marine Sanctuaries in 2010 and 2011 as well as recreational diver logs and reports. Recreational divers have visited the DIXIE ARROW for many years and their observations and images are published in popular dive guides and shipwreck books as well as on the internet. Their information supplements the archaeological data gathered by the NOAA survey team. The vessel size, observed site characteristics, and location all combine to conclusively indicate that the site is the wreck of the American tanker DIXIE ARROW.

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The DIXIE ARROW’s overall site remains measured 450 feet long by 60 feet wide with 30 feet of vertical relief above the seafloor. The site’s main feature is the intact but collapsing steel hull which lies sitting upright on its keel. The hull’s shape can be ascertained from the wreck’s skeleton with the interior structure collapsed within. The bow section includes portions of its stem that rises up thirty feet and sections of the forward deck and outer hull structure. The bow’s starboard side is more intact while the port side has broken off and fallen back on itself. Inside the bow’s starboard side contains its chain locker, including a two large chain piles, and hawse pipes just forward of where the forward deck has collapsed into the sand. Smaller machinery pieces such as the windlass and cargo pumps are located at the bow’s aft end but have fallen to the sand due to the collapsed deck (Farb 1985:98; Gentile 1992:63). The changes in hull reflect the site formation process at work on the wreck, both from the sinking event and the ongoing environmental factors.

At amidships the DIXIE ARROW’s remains have mostly fallen inside the hull leaving only sections of unidentifiable debris along with small sections of intact frames and hull plating. The vertical outer hull varies in height from three to ten feet and continues all the way to the stern. A small amount of deck beams, bulkheads, and cargo tank wall sections are in place. The tanker’s keel is visible in areas where the rest of the hull components are missing. A large amount of structure lies outside the hull and on the seafloor. The cargo or fuel tanks are emptied and have collapsed and there is no presence of oil on or within the shipwreck (Farb 1985:98-99).

Moving to the DIXIE ARROW’s stern, the triple expansion steam engine and three boilers are still in place along with shaft and propeller. In general, the stern area is largely broken up but the rises above the seafloor to 20 feet with many features to document such as bollards, a windlass, pumps, pipes, and hull features including hull plates, bulkheads, and frames. The propeller is mostly buried in the sand with only one blade visible with the rudder standing upright behind it. The stern superstructure has collapsed onto the seafloor next to the main wreck structure and lies upside down mostly buried in the sand (Farb 1985:100; Gentile 1992:64).

Overall, the site consists of a large steel hulled tanker that once carried a cargo of crude oil. The wreck’s location and cargo match historical accounts of DIXIE ARROW’s loss off Hatteras Inlet near Cape Hatteras, NC. Additionally the shipwreck’s size and visual construction features correspond to DIXIE ARROW’s historically reported characteristics.

SITE INVESTIGATIONS

During 2010 and 2011 NOAA’s Office of National Marine Sanctuaries completed an archaeological examination of the DIXIE ARROW as part of a larger ongoing project that began in 2008 to document the losses associated with World War II’s Battle of the Atlantic. The field work focused on the underwater battlefield off Cape Hatteras, North Carolina and documented several shipwrecks including the DIXIE ARROW. The project sought to answer research questions about the site’s characteristics and record the site’s extent remains. The survey gathered sufficient information to determine the level of

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structural integrity and assess its remains to determine if the site is eligible for nomination to the National Register of Historic Places. Additional surveys of the DIXIE ARROW are planned to continue the site assessment and archaeological analysis.

Section 8 – Statement of Significance

SUMMARY

The DIXIE ARROW’s archaeological remains are significant at the national level under criteria A; the shipwreck is associated with events that have made a significant contribution to the broad patterns of our history and criteria D; the shipwreck has yielded or may be likely to yield, information important in history or prehistory. DIXIE ARROW will provide information on merchant shipping during World War II, Axis military actions off the United States during World War II, merchant vessel design and use, merchant vessel cargo transport, shipboard life, and its wrecking event.

Merchant Shipping along the United States during World War II (criteria A)

DIXIE ARROW operated as merchant vessel during World War II supplying the Allies with valuable petroleum products to keep the war machine running. It exemplifies the importance placed on ordinary merchant vessels, such as freighters and tankers, to supply the world with commodities in times of crisis. DIXIE ARROW braved the coastal waters off the United States fulfill the need of Allied nations for oil. DIXIE ARROW was connected to the larger merchant shipping network during World War II that moved goods around the world. DIXIE ARROW, alongside other merchant vessels, connected and unified Allied countries that rallied together to pool resources to defeat the Axis powers during World War II.

Axis (U-boat) Military Actions off the United States in World War II (criteria A)

DIXIE ARROW’s loss is a representative example of the U-boat campaign off the United States during World War II. Operation Drumbeat directly attacked Allied merchant shipping up and down the East Coast and in the Gulf of Mexico between 1942 and 1945. DIXIE ARROW fell prey to three torpedoes from the German submarine U-71 and its remains now sit at the bottom of the sea below what was once a fierce battlefield just off the American shore. DIXIE ARROW’s physical remains are directly connected and associated with the U-boat actions during World War II. Its broken hull visibly portrays the moment in time when the U-71’s torpedoes exploded sending the vessel to the bottom.

Vessel Design, Use, and Adaptation (criteria D)

DIXIE ARROW was purpose built to transport petroleum products in bulk as well as general cargo. It was designed to be a tanker and that is the service it performed prior and during World War II. Upon the outbreak of World War II archival information suggests that DIXIE ARROW was not modified or outfitted with anti-submarine weaponry even though it operated in U-boat infested waters. DIXIE ARROW sailed only on coastal routes during World War II and it did not sail in any known convoys for

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protection because coastal convoys did not start until after the vessel’s loss. Archaeological survey will provide evidence of if the DIXIE ARROW was modified to operate during war time conditions.

Merchant Cargo Transport (criteria D)

Archaeological analysis of the DIXIE ARROW will yield information about what the DIXIE ARROW was transporting as well as how the material was stored. Archaeological study may also reveal if the DIXIE ARROW was carrying any other materials besides its official cargo of over 86,000 barrels of crude oil. It is possible that DIXIE ARROW was transporting additional war related goods that were not declared on the reports chronicling its loss. Documentation of the DIXIE ARROW’s hull shape, tank configuration, deck structures, and engine compartment will provide data on the evolution of tankers and merchant cargo transport.

Shipboard Life (criteria D)

Documentation of the DIXIE ARROW’s material culture will yield information about its crew and answer questions about ethnicity, social class, and shipboard life. DIXIE ARROW’s crew was forced to quickly flee the sinking vessel, leaving their personal effects behind. The information gathered from analysis of the crew’s effects will likely provide insight into life onboard an Allied merchant vessel operating in an active U-boat battlefield. DIXIE ARROW’s last crew consisted of 33 men with only 22 survivors from its sinking.

Wrecking Event (criteria D)

Newspaper reports carried limited information about the events surrounding DIXIE AROW’s sinking off Cape Hatteras, North Carolina. Primary source documents from the U. S. Coast Guard and U. S. Navy housed at the National Archives also do not recall the incident in much detail. The limited press coverage and historical documentation about the DIXIE ARROW’s attack means its wreckage is the only source for further investigation of its sinking. The site’s archaeological remains will shed light on the tactics U-boat captains used during Operation Drumbeat. Archaeological investigation of the shipwreck’s hull, machinery, cargo, and cultural artifacts may provide information that will confirm or contradict historical records as recorded from the vessel’s crew.

HISTORICAL SIGNIFICANCE

The single screw steam tanker DIXIE ARROW was built in Gloucester City, New Jersey by New York Shipbuilding Corporation. Its keel was laid on 11 August 1920 and it was launched almost year later from its south yard on 29 September 1921 (*Pacific Marine Review* 1922:88). It measured 468.3 feet long by 62.7 feet wide and 26.0 feet deep. Its gross and net tonnage was 8,046 tons and 4,960 respectively with an under deck tonnage of 7,834 tons. Its official number was 221735 and yard/contract number 266. DIXIE ARROW was a steel hulled tanker with two masts, two decks, and a shelter designed to carry petroleum in bulk with aft positioned machinery. It was constructed with web frames as well as longitudinal framing for increased hull rigidity and strength. The tanker’s construction was supervised

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by George Bucham and A.A. James. It had an *100A1 vessel rating. The rating meant the tanker was constricted under a Lloyd’s Register survey, it was suitable for seagoing service, and fit to carry dry and perishable goods. DIXIE ARROW’s rating also certified that it had good and efficient anchoring and mooring equipment. The tanker had ten double main cargo tanks that could carry four million gallons of commercial oil and 400,000 gallons of fuel oil that allowed the DIXIE ARROW to steam for 46 days (*Lloyd’s Register of British and Foreign Shipping* 1930: DIS-DOB; *Nautical Gazette* 1921:464; *Philadelphia Inquirer* 30 September 1921).

The New York Ship Building Corporation also built DIXIE ARROW’s 3,200 horse power four cylinder quadruple expansion steam engine. The engine was a four crank, direct acting surface condensing type with steam supplied by three single ended Scotch boilers. The engine propelled the loaded tanker at a speed of 11 knots. The tanker could accommodate a crew of 62 men (*Philadelphia Inquirer* 30 September 1921). DIXIE ARROW was equipped with all the latest technological advancements such as electric lights and a radio direction finder. Its radio signal letters were M.D.H.O.

Miss Isabelle Brown of Dallas, Texas christened the DIXIE ARROW at its launch. She was also the tanker’s sponsor and daughter of E.R. Brown who was connected with the Magnolia Petroleum Company of Dallas, Texas. She was also accompanied by her father, mother, Mrs. R.C. Holmes of New York, Calvin Payne of Titusville, PA, J. Pluymert, the superintendent of construction and architect of the Standard Transportation Company, and G.D. Ali, vice president of the Standard Transportation Company. The launch was described as, “a most successful launching and champagne was used to christen the ship. . . . Following the launching there was a luncheon at the main office” (*Philadelphia Inquirer* 30 September 1921).

DIXIE ARROW’s builders, the New York Shipbuilding Corporation was also known also as New York Ship. It began in 1899 by Henry G. Morse, with the financial support of Andrew Mellon and Henry Frick. It was called New York Shipbuilding because it was originally intended to be located on Staten Island but it was found to be cheaper to build the operation in New Jersey. In 1916 American International Corp. and W. R. Grace bought the business and expanded it for the war effort that include a relationship between the corporation and the United States Shipping board who contracted with them to manage the Gloucester city yard which built the DIXIE ARROW. Known as the south yard, it was actually owned by the United States Shipping Board. This yard included four building berths and covered over 36 acres. It was much smaller than the yard in Camden that the New York Shipbuilding Corporation actually owned which included 19 building berths and covered 129 acres. New York Shipbuilding Corporation’s south yard had been built for World War I war purposes at a cost of \$10,000,000 but just as work started the war ended. By September 1921 they had built four combination liners for the Shipping Board and four tankers, including the DIXIE ARROW. The DIXIE ARROW was the fourth of a contract for four tankers between the Standard Transportation Company and the New York Shipbuilding Corporation (*Nauticus* 1921: 17). The other three tankers were the *Yankee Arrow*, *Empire Arrow*, and *Levant Arrow*.

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During the fall of 1920 the United States Shipping Board authorized Standard Transportation Company to finance the construction of the DIXIE ARROW, the three other New York Shipbuilding Corporation’s tankers along with four other tankers to be built in Quincy, MA, one at Sparrows Point, MD, and one in San Francisco, CA. The Company was allowed to construct ten tank steamers under the provisions of the Merchant Marine Act which permitted ship operators to devote the equivalent of their excess profit’s taxes if an amount equal to the tax is devoted to shipbuilding (*Washington Post* 2 September 1920).

The DIXIE ARROW and the other three New York Shipbuilding Corporation tankers, all constricted under the same 1920 Shipping Board contract as the DIXIE ARROW, were built as a series of “Arrow” ships for the Standard Transportation Company. Between 1916 and 1921 twelve “Arrow” ships were built that measured roughly the same size. New York Shipbuilding Corporation built eight of them and Bethlehem Steel Company of Quincy, MA built the remaining four. The *Standard Arrow* was the first “Arrow” vessel built in May 1916 by the New York Shipbuilding Corporation. In the *Mobile Book of Ships* author Arthur Gordon discussed the importance of the “Arrow” ships on page 106.

This vessel was the prototype of the now famous Arrow ships, designed by Nicholas Pluymert of the Marine Transportation Department. There were 12 of these vessels in all. They were a combination bulk-oil and general cargo carriers. The main deck of these steamers was pierced with removable hatches, giving access to a ‘tween-deck space which ran the length of the ship. This was the case for general cargo. The tanks for bulk oil were in the lower holds. These vessels, in their day, were considered to have reached the height of the reciprocating-engine ship in efficiency and all-round tanker performance.

During World War I many ship-owners and builders started launching ships in a series with all the same design to save on production costs, construction time, and materials. These standardized ships additionally saved on personnel expenses since crews could easily be moved around from vessel to vessel without needing to be retrained (Gardiner 2000:67). This method continued after World War I and also continued during World War II. T-2 tankers as well as liberty and victory ships were later examples of this standardized process.

The DIXIE ARROW was the last of the “Arrow” ships built. The tankers were designed for the foreign petroleum trade between California and Asia as well as India and were known for their round the world trips. It ended up that the DIXIE ARROW spent less time than any other “Arrow” ship in the trade for which is was designed. Many of the tanker’s routes were changed to domestic coastal routes later in the 1930s as the world got closer to the outbreak of World War II. The ships were brought back closer to home since their design of being both a general cargo carrier and bulk oil carrier proved to be versatile and efficient (Gordon 1991: 30, 106-107).

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Name	Builder	Gross Tonnage	Dimensions (LxW) in feet	Launched	Completed	Cargo Capacity (bbls)	Fate
<i>Standard Arrow</i>	NY Shipbuilding Corp.	7,794	467.6 x 62.7	5/15/1916	8/31/1916	99,742	
<i>Royal Arrow</i>	NY Shipbuilding Corp.	7,794	467.6 x 62.7	10/30/1916	12/16/1916	82,148	scrapped in 1959
<i>Sylvan Arrow</i>	NY Shipbuilding Corp.	7,797	467.6 x 62.7	10/16/1917	1/15/1918	99,742	sunk by German U-boat torpedo 5/26/1942 off Trinidad
<i>Broad Arrow</i>	NY Shipbuilding Corp.	7,796	467.6 x 62.7	12/22/1917	3/27/1918	99,742	sunk by German U-boat torpedo 1/8/43 off Dutch Guiana
<i>China Arrow</i>	Bethlehem Steel Company	8,403	468.3 x 62.7		10/1/1920		Sank by German U-boat torpedo off Virginia 2/5/1942
<i>Japan Arrow</i>	Bethlehem Steel Company	8,327	468.3 x 62.7		11/24/1920		scrapped in 1947
<i>Java Arrow</i>	Bethlehem Steel Company	8,327	468.3 x 62.7		2/24/1921		scrapped in 1959
<i>India Arrow</i>	Bethlehem Steel Company	8,327	468.3 x 62.7		3/17/1921		sunk by German U-boat torpedo 2/5/1942 off New Jersey
<i>Yankee Arrow</i>	NY Shipbuilding Corp.	8,046	468.3 x 62.7	5/10/1921	8/2/1921	99,742	
<i>Empire Arrow</i>	NY Shipbuilding Corp.	8,046	468.3 x 62.7	5/24/1921	8/7/1921	99,742	scrapped in 1938
<i>Levant Arrow</i>	NY Shipbuilding Corp.	8,046	468.3 x 62.7	7/25/1921	10/21/1921	99,742	scrapped in 1938
<i>Dixie Arrow</i>	NY Shipbuilding Corp.	8,046	468.3 x 62.7	9/29/1921	11/29/1921	99,742	sunk by German U-boat torpedo 3/26/1942 off North Carolina

Table 1. List of "Arrow" ships (Gordon 1991).

On 23 November 1921 DIXIE ARROW completed its trials and on 29 November it officially delivered to its owners the Standard Transportation Company (*Pacific Marine Review* 1922:88; *Philadelphia Inquirer* 24 November 1921). The parent company of the Standard Transportation Company was the Socony Vacuum Oil Company. The Socony Vacuum Oil Company was formed in 1931 after a merger between the Standard Oil Company of New York and the Vacuum Oil Company. At that time it was the third largest oil company in the world. Vacuum Oil's roots date back to its founding in 1866 and it specialized in producing illuminating and lubricating oils as well as gasoline (Standard Oil 1914:82). The Standard Oil Company of New York was formed as a result of the anti-trust breakup of Standard Oil in 1911. The original Standard Oil was formed by John D. Rockefeller in 1870 and was involved with oil producing, transporting, and refining. It was the world's first and largest multinational corporation that due to its monopoly on the industry was forced to be broken up by the U.S. Government in 1911. Thirty three separate companies emerged including two of the biggest, Standard Oil of New Jersey (which eventually became Exxon) and Standard Oil of New York or also known as Socony (which

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eventually became Mobil). Socony had already been formed back in 1882, under the rule of Standard Oil, to focus on international overseas markets, but it was not until the reorganization in 1911 that the company became an independent body (Vassiliou 2009:560).

Notices of DIXIE ARROW’s launch and trial stated that the tanker was built for the Standard Transportation Company of New York but in actuality it was owned by the Socony Vacuum Oil Company of New York. Oil companies had many subsidiaries and sub-companies therefore tracking the operation of a specific company or ownership and operation of an individual vessel is difficult. Official registry information in Lloyds of London between 1921 and 1942 links the DIXIE ARROW from 1921-1932 to the Standard Transportation Company, from 1932-1935 to the Standard Vacuum Transportation Company, and lastly from 1936-1942 to the Socony Vacuum Oil Company. In actuality the tanker never really changed owners instead, its owners changed names due to the creation or closure of companies. For its entire life DIXIE ARROW was an American flag vessel registered at the port of New York.

DIXIE ARROW’s first year of service took it on one of its longest trips of its career, from New York through the Panama Canal to the Orient. This trade was what the “Arrow” ships were designed for and most of them stayed on this route until the outbreak of World War II. In late 1921 DIXIE ARROW loaded 10,000 tons of fuel oil and departed New York. It sailed through the Panama Canal with a stop in Colon and then another stop in San Francisco to pick up water and bunker before finally making it to Hong Kong. After offloading its cargo it loaded a new cargo of coconut oil in Manila before heading back to New York. Normally a tanker might sail home in ballast but instead its owners saw a way to increase profits and loaded the DIXIE ARROW’s hold with a non-traditional cargo. “This incident is not a precedent, frequently Standard Oil company tanks coming from the Orient bring vegetable oils from principally nut and what is known as China wood oil as well as stopping at the islands and bringing coconut oil” (*Port Arthur Daily News* 24 May 1922). This trip took over 6 months to complete and was a testament to the “Arrow” ships’ seaworthiness and range. The DIXIE ARROW then sailed in ballast from New York to Port Arthur, TX where it picked up another load for the Hong Kong. The tanker departed on 7 October 1922 with 95,000 barrels of refined oil. It again stopped in San Francisco on its way to Hong Kong (*Galveston Daily News* 6 October 1922). The tanker would steam to Hong Kong once more and end up back in San Francisco in February 1923 before changing its service to supplying American ports. The tanker would concentrate on two main routes for the next eight years.

DIXIE ARROW’s voyages, after its brief time in the Far East, focused on round trips between various ports in Texas and New York as well as long hauls back and forth through the Panama Canal between Los Angeles/San Pedro and the east coast ports of New York City, Boston, and Providence. Since the “Arrow” ships were a combination tanker that could carry bulk petroleum products as well as general freight it was flexible with its schedule and cargo types. Due to the regular nature of its trips, the historical record does not provide a lot of details surrounding DIXIE ARROW’s history. Newspapers mainly only mention that the vessel arrived or departed but do not focus on cargo details therefore it is hard to track what is carried. The more routine and uneventful a vessel’s career the less information that makes it into record books. On 10 August 1925, the *Port Arthur News* did write about the DIXIE ARROW’s involvement with transporting oil out of Texas.

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Twenty-six ships, carrying 7,214,623 gallons of fuel oil and 51,161,363 gallons of refined oils, sailed from the Magnolia Petroleum Company’s Sabine district terminals in the month of July, according to a report issued by the company today. The largest single cargo carried was by the Dixie Arrow, comprising 3,929,063 gallons of refined oil, and 158,469 gallons of fuel oil, the report stated.

The *Port Arthur News* would again provide some insight into DIXIE ARROW’s cargo when it listed case oil as its cargo being carried from Beaumont, TX to New York on 14 November 1925. Case oil is a term applied to cargo consisting of various kinds of oil packed in 5 gallon cans. It was usually packed in twos in wooden cases. The types of petroleum products packed in cases were typically kerosene, refined petroleum, petroleum, gasoline, benzene, turpentine, or lubricating oil (Thomas 1928: 92-92).

In 1923 DIXIE ARROW was withdrawn from its foreign service and moved to the domestic petroleum trade. The Great Depression caused most of the “Arrow” ships to be moved back to home to focus on coastal routes. Between 1923 and 1931 DIXIE ARROW serviced the three largest oil producing and consuming centers of the United States: the North Atlantic states, states bordering the Gulf of Mexico, and the Pacific Coast States, particularly California. In 1923 new oil fields opened up in the Los Angeles area and the intercoastal oil trade through the Panama Canal from the Pacific to the Atlantic shore began immediately. DIXIE ARROW’s owners seized this new market and enlisted the DIXIE ARROW in this route.

In 1923, nearly 8 million tons, or 20% of California output, was shipped to the East Coast. Nearly all of these movements were crude oil and, due to the lack of tankers, had to be shipped in cases. . . Refined products were rapidly substituted for crude shipments as West Coast refiners expanded their plants to cover the newfound local output. In 1923 these inter-US coastal shipments alone represented 15% of world deepsea oil trades” (Ratcliffe 1985:56).

DIXIE ARROW supplied the domestic market and might have also delivered bunker fuel to the Panama Canal zone for transiting vessels. The use of petroleum products by the oil industry combined with the marine and railroad companies as well as use by public utility plants and commercial and domestic heating kept DIXIE ARROW busy (National Industrial Conference Board 1930:53, 83). “The most important and single use of fuel oils is for the world’s navies and merchant fleets. In 1928 the United States consumption for this purpose was approximately 94 million barrels, or 26 percent of the total fuel used” (National Industrial Conference Board 1930:87). The ports most frequently in need of bunker included New York, New Orleans, Galveston, Sabine, Mobile, Los Angeles, and San Francisco. Tankers supplied other tankers and vessels with fuel for both the coastwise and international routes. The consumption of bunker oil for vessels in the coastwise trade, like the DIXIE ARROW, increased from

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16 million barrels in 1921 to about 36 million barrel in 1928 (National Industrial Conference Board 1930:88). "A large part of this consumption is by tankers engaged in the inter-regional shipments of oil products from the Pacific coast and the Gulf ports to the Atlantic coast points for refining or consumption" (National Industrial Conference Board 1930:88).

The East Coast ports DIXIE ARROW serviced, in conjunction with its Panama Canal transits, were New York, Boston, and Providence. The North Atlantic region, more specifically the New England states, consumed a large amount of barrels due to their importance as a manufacturing center that required large energy requirements. Additionally a heavy amount of foreign traffic passed through this area making a demand for marine bunker fuel. Oil refineries were located around New York and New Jersey that required the movement of crude oil by pipelines and tankers. By 1927 the crude shipments out of California through the Panama Canal lessened and became insignificant by the 1930s. The rise in demand for oil combined with adequate refining capabilities on the West Coast did not produce an excess amount of oil available for shipment out of the region. Additionally at the same time, Texas and Gulf of Mexico region operations began to be major oil producers and were closer to the East Coast than California for tanker shipments.

Texas emerged on the oil scene in the 1920s and by the 1930s there were pipelines running from Texas to New York, Philadelphia, and interior states but they were controlled by Standard Oil Company of New Jersey and unavailable for use by the other companies. In order to be competitive companies like the Socony Vacuum Oil Company used tankers to cheaply move oil out of the Gulf ports to the East Coast. Tankers ended up taking away the trade from the inland routes via rail and pipelines. "Tankers were no longer a separate part of the oil scene simply representing sea transportation. They were now an integral and competing part of the world oil transportation scene" (Ratcliffe 1985:56-58). Texas was a heavy producer of crude oil but did not have sufficient refining capability to process its resources so the crude was shipping to refineries in New York and New Jersey.

DIXIE ARROW's normal route for the rest of its career until its loss in 1942 was between Texas and the Atlantic states of New York, Massachusetts, and New Jersey. The tanker stopped in Texas at the Magnolia Petroleum Company's docks, which was an affiliate of DIXIE ARROW's owners the Socony-Vancouver Oil Company, as well as the Humble Oil and Refining Company's piers to load. Texas coastal ports of Galveston, Houston, Beaumont, Texas City, Port Arthur, and Sabine served as a launching ground for the movement of petroleum tankers. The primary cargo shipped out of Texas was crude with gasoline being frequently carried also. It is likely that during DIXIE ARROW's return trips to Texas it sailed in ballast with no load, a common practice for the tanker fleet (Ratcliffe 1985:80).

DIXIE ARROW's coastal route did not change with Europe's entrance into World War II in September 1939 or United States' entrance into World War II in December 1941. The tanker continued to move petroleum products between Texas and the Atlantic states. The products DIXIE ARROW carried could have been offloaded and then transferred into other tankers that took it to Europe or the cargo could have been used on the home front. It was common for American tankers to transport oil to ports such as New

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York and Halifax where it was loaded onto British flagged vessels and carried across the Atlantic (Frey and Ide 1946:84-85).

By 1940 there was a fleet of 353 tankers of more than 3,000 gross tons under the United States flag, ranging in capacity from 25,000 barrels for the old ones to 150,000 for the most modern. About 260 normally were engaged in moving crude oil and refined products from the Gulf coast to the eastern seaboard. These, 260, in addition to the foreign-flag vessels which brought petroleum from the Caribbean area, furnished more than 95 percent of all oil to the east coast (Frey and Ide 1946:89-90).

Both military and non-military consumer demand increased during World War II and the United States needed a strategy to deal with the petroleum transportation problem. The outcome was the establishment of the Petroleum Administration for War (PAW) to oversee the activities of the wartime petroleum industry including conservation, research, allocation, and shipment (Frey and Ide 1946:84-85). With U-boats actively sinking tankers off the American coast starting in 1942 the oil refineries had a hard time having a consistent supply of crude for processing. This shortage threatened the production of petroleum for war products. The Gulf Coast states had a surplus of crude and refined products but there were not enough available tankers to transport it. DIXIE ARROW was one of the tankers that were employed to routinely travel back and forth between Texas and northeast states (Frey and Ide 1946:216-217).

By 1940 the Socony-Vacuum Oil Company operated fifty-six tankers ranging from 900 tons to 9,900 tons including 10 of the original 12 "Arrow" ships. They no longer owned the *Levant Arrow* and *Empire Arrow* since they had been damaged in a hurricane and both scrapped in 1938 (Gordon 1991; Booth 1940:17). Their newest tanker was the *Mobilube* built in 1939 and their oldest were several from 1916 that were part of the company's first American flag tanker fleet (Booth 1940:17).

During World War II DIXIE ARROW operated in locations susceptible to attack either from air or by sea. DIXIE ARROW's owners, the Socony Vacuum Company, suffered many vessel losses during World War II. Thirty-two of its vessels were lost due to torpedoes, mines, or collisions. An additional eighteen ships were damaged from enemy torpedoes or mines but repaired and put back into service (Gordon 1991). To try and safeguard its vessels, oil companies employed many defensive mechanisms to defend their ships from enemy actions such sailing in convoys or being outfitted with weapons. Unfortunately, due to DIXIE ARROW's coastal routes up and down the eastern seaboard it did not sail with convoys and was also not equipped with weapons. To combat U-boat attacks to merchant vessels along the American East Coast and in the Gulf of Mexico a coastal convoy system was established in 1942 but it was not fully up and running until that summer. As the DIXIE ARROW was sunk in March 1942 it had no ability to ever use the convoy system. By May 1942 there was a major convoy route running between Key West and New York along with its return line back to Key West (KN-NK). Two subsidiaries of that line were in place by August and September including one that ran between Key

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West and Galveston/Houston and back (KH-HK) as well as another line between Key West and Pilottown/New Orleans and back (KP-PK). DIXIE ARROW would have used these convoy lines if they had been in place during its operation in World War II (Roscoe 1953:133-134).

On 19 March 1942 the DIXIE ARROW departed Texas City, TX with a cargo of 86,136 barrels of crude oil for Paulsboro, New Jersey under the command of Captain Anders M. Johanson. “The *Dixie Arrow* was known to be a good ship to work aboard. Johanson was a kind and gentle man and also a first-rate shiphandler. He had seen to it that his ship had the best cook available and that work schedules were let reasonable. The crew was, as a result, close knit, hard-working group, considered by the company to be one of its most efficient” (Hickam 1989: 99). The DIXIE ARROW continued its unescorted voyage north up the east coast and into the U-boat patrolled waters off North Carolina. “Johanson was very much concerned about taking his ship past Hatteras. He had remarked to his chief engineer that he had been instructed to follow the 40-fathom curve, a very difficult task considering the many ships in the vicinity, all traveling blacked out and as rapidly as possible” (Hickam 1989: 99).

U-71 moved into the waters off Cape Hatteras as a replacement for the U-124 and by 26 March was actively on patrol and had already sunk one vessel, the freighter *Oakmar*, 300 miles east of North Carolina. Its captain, *Kapitänleutnat* Walter Flachsenberg , “was about to dive and sleep for the day when his lookout spotted some masts on the southern horizon. The sun was up but Flachsenberg waited to see if the vessel was of interest. It was. A tanker! Almost disbelieving his eyes, Flachsenberg saw it was entirely alone. He ordered the U-71 down and began to maneuver to get the tanker between him and shore” (Hickam 1989: 99). Around eight o’clock in the morning on 26 March the U-71 fired two torpedoes at the DIXIE ARROW twelve miles southwest of Diamond Shoals Light near Cape Hatteras, North Carolina (National Archives US Coast Guard RG 26 box 5).

DIXIE ARROW’s crew had no warning and were unprepared for U-71’s violent attack. They had been sailing northward at 10.5 knots in clear, calm, and smooth seas with a gentle breeze when hit. Its base course was set at 30 degrees but it performed a zig zag pattern (altering course 45 degrees every 6-9 minutes) to provide some defensive measures against the U-boats. DIXIE ARROW’s crew were positioned around the ship to serve as lookouts and it had a ship sailing ahead of it and another one sailing 10 miles behind it. Able seaman Oscar Chappel was at the helm and spotted the U-71 but had no time to give out a warning (Hickam 1989: 99). Within seconds two torpedoes struck DIXIE ARROW’s starboard side. The first one hit just below the deck house, destroying it, the second one hit just aft of where the first one hit (National Archives US Navy RG 38 box 221). “The entire midships house, including the living quarters, officers’ messroom, pantry, and navigation bridge were completely engulfed in flames” (Gordon 1994:47-48).

Six men were on the bridge along with seaman Chappel. He could see that most of the crew had collected on the bow. To keep the flames away from them, Chappel ordered the other men off the bridge and began to turn the *Dixie Arrow* into the wind. On the bow, knots of men, formerly stranded by

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flames, were suddenly freed. Seaman Chappel held the wheel firmly while the wall of flames raced towards him. He just had time to lock the wheel before he was enveloped in the inferno. Given a respite by the self-sacrifice of Chappel, the men of the *Dixie Arrow* began to abandon ship (Hickam 1989: 99-100).

“ . . . eight men were believed instantly killed when trapped below deck in the dining cabin. Another dies when his life raft drifted into a pool of burning oil and still another was killed when the explosion hurled him against a davit” (*New York Times* 29 March 1942). Captain Johanson came out of his cabin in full dress uniform and headed to the bridge after the first two torpedoes. Before he made it very far a third torpedo hit the tanker just aft of the deck house and he never emerged from the explosion. First assistant engineer, William R. Wolfe, shut down the engines and set the vessel helplessly adrift. The surviving crewmen had to jump into the water to escape the flames and swim for their lives (Hickam 1989:100-101). Only one of DIXIE ARROW’s four lifeboats (no. 4) was successfully launched with eight men onboard. After an half an hour, a Navy seaplane and the destroyer USS *Tarbell* (DD142) arrived on scene. The plane immediately dropped two bombs on the U-boat and instead of immediately picking up the survivors, the destroyer began hunting the U-71 and dropped a series of depth charges (Blair 2000:519). “The U-71 shook from end to end, bracketed by the *Tarbell*’s depth charges. Flachsenberg began to zigzag his U-boat, turning violently this way and that. Above, the sounds of the destroyer came nearer and then faded. Flachsenberg ordered full power. The U-71 ran for her life” (Hickam 1989:101).

The *Tarbell* stopped its pursuit and rescued the men in the lifeboat along with fourteen others who were in the water. They were taken into Morehead City, North Carolina but soon transferred to Norfolk, Virginia for better accommodations. Within an hour of the incident, the ship broke in two near amidships but remained afloat on fire for several hours before sinking the night of the 26th. Eleven of DIXIE ARROW’s crew, including four deck officers, the radioman, 6 unlicensed seaman, and its captain, did not survive. They died from the initial torpedo explosions as well as from the resulting fire (National Archives US Navy RG 38 box 221). DIXIE ARROW’s burning hulk was visible for miles and finally fell to the seafloor in 90 feet of water after possibly drifting into the Hatteras minefield and detonating a mine (Gentile 1992:63).

The U-71 led a very successful career that included not only sinking the DIXIE ARROW but 5 other vessels for a total tonnage of 38,894 gross tons. The type VII-C submarine had been ordered on 25 January 1939 but was not launched until 31 October 1940 from the shipyard of F. Krupp *Germaniawerft* AG Kiel, Germany. During the war U-71 participated in ten war patrols, covering 366 days, with captains Walter Flachsenberg and Hardo Rodler von Roithberg. The war patrols lasted anywhere from 19 days to 52 days. U-71 was on its 5th patrol when it sank its 3rd victim, the DIXIE ARROW. It was taken out of service and scuttled on 2 May 1945 in Wilhelmshaven, Germany (Brechtelsbauer 2013a.).

On 30 March 1942 a Coast Guard plane reported observing the DIXIE ARROW’s remains including its masts sticking out of the water. A red nun buoy was placed at the site and for the next year it became a

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place for target practice for the Marine Air Corps Station at Cherry Point, North Carolina (Gentile 1992:63). In 1945 Navy divers recovered the tanker’s bell, and it was later presented to the “Arrow” ships designer Nicholas Pluymert. He dedicated the bell to Oscar Chappel. “When the bell of the DIXIE ARROW is tolled. Let it toll for Oscar G. Chappell, Able-bodied Seaman, who for his great deed was posthumously awarded the Distinguished Service Medal of the United States Merchant Marine” (Gordon 1994). The wreck was later wire-dragged to ensure it was not a hazard to navigation (Gentile 1992:63).

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