

North Carolina Material Culture: An Analysis of the Excavation Conservation and Display of the Confederate Ironclad CSS *Neuse*

by

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The CSS *Neuse* was a Confederate Ironclad stationed in Kinston, North Carolina. Today, it is one of a few surviving commissioned Confederate Ironclads, and is forgotten by many due to its lack of significant military history. While the ship does not have an extensive military background, its recent history is interesting and complex. This research is a multidisciplinary analysis of the ship's excavation, conservation, and display. The *Neuse* is a testament to the importance of cooperation between archaeologist, conservators, and museum professionals. During its original excavation, the ship sustained damage that affected the future conservation of the wooden hull. Also, since conservation was in its infancy during the time of the excavation, treatments were experimental. This research seeks to understand the full history and condition of the ship and associated artifacts in order to effectively preserve and display them for the future. Chemical analysis was employed to determine effectiveness of past treatments as well as levels of degradation, and recommendations were included regarding future conservation treatments. The *Neuse* is an important piece of North Carolina material culture, and an understanding of effective conservation is essential to the life and future display of the ship.

North Carolina Material Culture: An Analysis of the
Excavation Conservation and Display of the Confederate Ironclad CSS
Neuse

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by

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Table of Contents	Page
Table of Contents	VII
List of Figures	IX
Chapter 1.0: Introduction	1
Chapter 2.0: Military History of CSS <i>Neuse</i>	4
2.1 Preparing North Carolina for War	5
2.2 Construction of the <i>Neuse</i>	8
2.3 Foster's Raid	12
2.4 Armor, Machinery, and Weapons	15
2.5 Orders to Sail to New Bern	18
2.6 Battle of Wyse Fork	21
Chapter 3.0: Excavation of CSS <i>Neuse</i>	24
3.1 A Community Project	24
3.2 A Historical Account	26
3.3 A Cause for Change	35
3.4 Archaeology Today	37
Chapter 4.0: Analysis of the CSS <i>Neuse</i> Wooden Hull	46
4.1 A Brief History of Shipwreck Conservation	46
4.2 Conservation History of the CSS <i>Neuse</i>	48
4.3 Analysis	53
4.4 Samples	55
4.5 Fourier Transform Infrared Spectroscopy Method	56
4.6 Scanning Electron Microscope Method	57
4.7 Fourier Transform Infrared Spectroscopy Results	58
4.8 Scanning Electron Microscope Results	62
4.9 Conclusion	70

Chapter 5.0: Treatment and Analysis of Artifacts Associated With CSS <i>Neuse</i>	72
5.1 Historical Background	72
5.2 Previous Conservation and Chemical Analysis	75
5.3 Treatment Proposal	81
5.4 Methodology	88
5.5 Artifact Treatment	91
5.6 Analysis and Results	100
5.7 Storage and Recommendations	104
Chapter 6.0: Interpreting the CSS <i>Neuse</i>	106
6.1 A Brief History of the CSS <i>Neuse</i> State Historic Site	106
6.2 Historiography of Museums	111
6.3 The Importance of Artifacts in Museums	112
6.4 Effective Museum Design and Interpretation	117
6.5 Moving Into the Future	122
Chapter 7.0: Conclusion	125
Appendix	130
Bibliography	150

List of Figures	Page
Figure 2.0 Diagram of CSS <i>Neuse</i> 's Construction	10
Figure 3.0 CSS <i>Neuse</i> Excavation	27
Figure 3.1 Visitors Viewing CSS <i>Neuse</i> Excavation	28
Figure 3.2 CSS <i>Neuse</i> Excavation Utilizing Drums	30
Figure 3.3 Wrench Truck Used to Move CSS <i>Neuse</i>	33
Figure 4.0 Morris Bass Sampling Wood From CSS <i>Neuse</i>	55
Figure 4.1 Core Sample Orientation	56
Figure 4.2 FTIR Standard for Linseed Oil	59
Figure 4.3 FTIR Standard for Timbor®	59
Figure 4.4 FTIR Comparison of Wood, and Timbor®	60
Figure 4.5 FTIR Comparison of Wood Samples and, Linseed Oil	61
Figure 4.6 SEM Depiction of Wood Planes	63
Figure 4.7 SEM Depiction of Tracheids and Vessels	64
Figure 4.8 SEM Depicting Wood Cell Structure	65
Figure 4.9 SEM Sample 4 Wood Cell Structure	66
Figure 4.10 SEM Sample 5 Wood Cell Structure	66
Figure 4.11 SEM Sample 6 Wood Cell Structure	67
Figure 4.12 SEM Sample 7 Wood Cell Structure	67
Figure 4.13 SEM Sample 8 Wood Cell Structure	68
Figure 5.0 Iron Clinkers	73
Figure 5.1 FTIR Spectra of Urethane Alkyd Linseed Oil Rich in Comparison to <i>Neuse</i> Shot D coating	78
Figure 5.2 SEM Chart Listing Percent Weights of Elements Found on Surface of Shot R	80
Figure 5.3 Canister and Shot	83
Figure 5.4 Shot A	83
Figure 5.5 Front of Powder Tank Lid	85
Figure 5.6 Back of Powder Tank Lid	85
Figure 5.7 Front Side of Chamber Pot Lid	86
Figure 5.8 Back Side of Chamber Pot Lid	86
Figure 5.9 Front of Ladder Rung A	87

Figure 5.10 Back of Ladder Rung A	87
Figure 5.11 Chart Describing Iron Artifact Treatment	98
Figure 5.12 and 5.13 Shot A After Treatment	101
Figure 5.14 and 5.15 Powder Tank Lid After Treatment	102
Figure 5.16 and 5.17 Chamber Pot Lid After Treatment	103
Figure 5.18 and 5.19 Ladder Rung A After Treatment	103

Chapter 1.0: Introduction

The CSS *Neuse* is one of North Carolina's most important pieces of material culture. It is a rare artifact from the Civil War, as it is one of only a few surviving Confederate ironclad battleships. The history of the ship is unique in the traditional sense, but also as it relates to the progression of collecting material culture and the professionalization of museums. The *Neuse's* excavation, conservation, and display particularly relate to the emerging field of material culture. This thesis primarily focuses on these three aspects of the *Neuse's* history.

The content not only studies the process of excavation, conservation, and display, but it also demonstrates the evolution of how material culture was viewed in the past and how these changing ideas directly affected the ship's history. Progressive thoughts concerning material culture also had a great influence on how the ship and associated artifacts were originally conserved. For example, the discussion of the ship's excavation examines the views of material culture during the 1960's and how they affected the actual historical excavation of the *Neuse*. The excavation of the ship played a large role in when and how it was conserved. This is most obviously seen when one studies how the ship was treated after being pulled from the river. Typically, shipwrecks are painstakingly cared for and great measures are taken to ensure that the archaeological wood remains wet. Unfortunately, this was not the case after the *Neuse* was excavated. The wooden hull of the ship was allowed to air dry, directly affecting possible future conservation treatments.

The conservation chapter explains the professionalization of collecting material culture and why conservators chose their treatments. Conservation was a relatively new field in America during the 1970's, when the *Neuse* was being treated. The methods of excavation provided a great sense urgency for conservators treating the ship and artifacts. Due to the nature

of conservation during the 1970's treatments used were largely experimental. Throughout the ship's recent history, the wooden hull has been under distress. Some questions that surround the original treatment methods applied to the ship and artifacts involve their effectiveness and sustainability. Also, if the original treatments were not effective what must be done to ensure the *Neuse's* hull and artifacts are protected in the future? Answering these questions will provide future conservators with information on how to best treat the ship and associated artifacts for years to come. Well-conserved artifacts are essential to museums and how they communicate history to the public.

Finally, the display and public history chapter discusses the professionalization of history and museums. A theme throughout this thesis is the progression of how material culture is viewed by professionals and the public alike. Museums have undergone changes in their organization and how artifacts are used to interpret history. The *Neuse* has called several locations home, each with its own set of interpretation challenges. Most recently, the ship was relocated to the *Neuse* Civil War Interpretive Center. This move will provide many new opportunities to interpret not only the *Neuse* but also expand to teach how the ship affected the Civil War in Eastern North Carolina.

In order to complete this project, a great deal of original research was required. The *Neuse* is largely forgotten by many in North Carolina, and published resources are extremely limited. Thankfully, the *Neuse* State Historic Site and East Carolina University have a substantial collection of original manuscripts detailing the history of the ship. These resources were utilized to compile information and stitch together pieces to communicate a complete history of the ship. Also, to research and answer questions surrounding the original conservation wood analysis of the hull was completed utilizing scientific tools at East Carolina University.

Roughly 30 objects were retreated with the goal of gaining a greater understanding of past treatments while also determining the best methods for future conservation methods. This research is innovative because it combines two vastly different fields, science and history, to interpret the life of the *Neuse*.

Chapter 2.0: Military History of the CSS *Neuse*

The American Civil War was one of the darkest times in American history. Brother fought against brother in a war that would ultimately change the country forever. Causes of the Civil War are numerous and complex. For many states in the South politics, economics, and the desire to maintain cultural traditions were causes for secession. This was not the case in North Carolina, the last state to separate from the Union. This was largely due to Union military action on the coast and South Carolina's secession. Although North Carolina was the last to officially secede from the Union, it was one of the greatest contributors of manpower to the Confederate cause. The state sent the most men and suffered the most casualties of any Confederate state. Approximately 42,000 North Carolinians lost their lives in the Civil War.¹

North Carolina's coastal geography played a large part in the Confederate strategy. Eastern North Carolina was of particular importance because of its intricate waterway system with many rivers and ports along with two large sounds. Wilmington, Fort Fisher, and New Bern include some of the most important military sites in the Confederacy. Twenty-two ironclad battle ships were commissioned by Confederate secretary of the Navy, Stephen Mallory. Realizing North Carolina's maritime advantage, Mallory ordered two of these ships to be built in North Carolina. The first called CSS *Albemarle* was recognized as a success in the Confederate Navy. The second, *Neuse* has been largely forgotten by many historians. The *Neuse* is one of the few remaining Confederate ironclads, and deserves recognition from both historians and the public. Although it did not engage in fierce military battle, the *Neuse* has a rich history worthy of attention.

¹ North Carolina Museum of History, "History Highlights-Nineteenth Century North Carolina," <http://ncmuseumofhistory.org/nchh/nineteenth.html#1861-1880> (accessed December 31, 2012).

2.1 Preparing North Carolina for War

Although North Carolina was the last to secede from the Union, it provided more soldiers than any other state in the Confederacy. When the state's secession was official the General Assembly granted Governor Ellis authorization to send troops that were not needed for coastal duty to Virginia. Later, a bill was passed to authorize the counties to make subscriptions for the purpose of arming and training volunteers. Ellis raised ten regiments of state troops and 50,000 volunteers. State troops were expected to serve for the duration of the war and volunteers were asked to serve for one year. The General Assembly issued a 5,000,000 dollar bond, which was granted to meet the initial expense of organizing and supplying recruits. Volunteers were abundant in North Carolina. During the early months of the war patriotism was especially high. Parades were given as the first soldiers marched into battle. Many of the volunteer troops were inexperienced, but later developed into excellent soldiers. Much of the troops' success was due to Adjutant General James Martin. Although these troops were well trained, they came at a price. Governor Ellis's successor, Henry T. Clark, announced that an additional 6,500,000 dollar was needed to continue the war effort. Not long after Clark's announcement the state transferred its military forces to the Confederacy. This action shifted the financial burden of the war from the taxpayers of North Carolina to the newly formed Confederate government.

With the overwhelming number of volunteers, the State fell short on supplying every soldier with armaments. The state seized the United States Arsenal at Fayetteville, where it acquired 37,000 pieces of armament, some of which dated back to the Revolutionary War. In addition to these newly acquired muskets, agents scoured the Confederacy in search of firearms. The state collected rifles of all shapes and sizes in an effort to equip soldiers. In some cases, soldiers were fitted with a pike, which were wooden poles that were capped with a sharp iron

point. The state was in an even shorter supply of heavy artillery. Aside from a few pieces of antiquated artillery taken at the coastal forts and the Fayetteville Arsenal, North Carolina entered the war with only four old smoothbore cannons. Measures were taken to supplement the state's lack of heavy artillery by melting old church bells, and scraps of metal to construct big guns, but these efforts were in vein. Many units were left without proper equipment.

The North Carolina coast was slightly more prepared for battle due to its armed forts. Although small, the Confederate Navy was destined to play an important role in North Carolina and the Confederacy's future. North Carolina had several important ports like Wilmington and New Bern that were essential to the states war effort. These ports received supplies and provided strongholds of protection.

At the beginning of the war in 1861 the Union navy consisted of about ninety ships. Over half were obsolete sailing ships and the rest were stationed in foreign ports. This was a cause for concern and Union Navy Secretary Gideon Wells undertook a massive shipbuilding project. At the end of this project nearly 700 ships were prepared for battle. The Confederate Navy was at a grave disadvantage in both sea power and manpower. Confederate President Jefferson Davis was not knowledgeable about naval power or policy. On February of 1861 he appointed Stephen R. Mallory as the Secretary of the Confederate navy. Mallory was a Senator from Florida with much naval experience. He had served on the Senate's Naval Affairs Committee and became the chairperson in 1857. This experience propelled his career as Secretary of the Confederate Navy. Mallory knew the strength of the newly improved Union Navy and was convinced that the secret to Confederate success would be found in naval power.

Mallory recognized that traditional wooden ships were no longer sufficient means of winning a war. He once predicted that "Naval engagements between wooden frigates, as they

are now built and armed, will prove to be forlorn hopes of the sea, simply contests in which the question, not victory, but of who shall go to the bottom first, is to be decided.”² Mallory determined that ironclads should be the focus of the Confederate Navy’s efforts because their invulnerability would easily compensate for their lack of numbers. These ships were designed to be floating batteries, each armed with at least two long-range cannons and thick iron plating. In North Carolina, ironclad ships served two purposes. The first was to protect Wilmington and advances towards the Cape Fear River; the second was to recapture sounds in key locations such as in New Bern and Fort Macon. Early Confederate ironclads were flawed and did not fare well in action. Four ironclads were completed in North Carolina. The first two, the *Raleigh* and the *North Carolina*, were designed by John L. Porter. These ships were among the most poorly constructed Confederate ironclads. Each was 175 feet long, 45 feet at the beam and had a draft of 13 feet. Built in 1862, both ships suffered a grim fate. The *Raleigh* escorted two Confederate blockade-runners to sea. While on the voyage, the ships were confronted by two Union blockade-runners and traded shots with one of the Union ships. Upon its return trip home it ran aground on a falling tide and eventually snapped in two pieces. The *North Carolina* suffered an even darker fate when it sank in its own moorings due to a rotten worm eaten bottom.

The fall of 1862, Mallory ordered three additional ironclads to be built in North Carolina. Their purpose was to control the states costal region and to protect waterways such as the Cape Fear River. The latter mission was of the upmost importance because of Confederate fortifications, and trade centers located further inland. These ships were to be smaller, only 158 feet in length and 38 feet in width with an 8foot draft. The first was to be built in Tarboro by J.

² Richard Rush and Others ed., *Official Records of the Union and Confederate Navies in the War of the Rebellion*. (Washington: Government Printing Office, 30 vol, 1894-1914), series II, 742, quoted in Leslie S. Bright, William H. Rowland, and James C Bardon, *C.S.S. Neuse A Question of Iron and Time* [Raleigh, NC: Division of Archives and History North Carolina Department of Cultural Resources, 1981], 5.

G Martin and Gilbert Elliot. This ship, however, would not see completion due to a Union raid that destroyed the partially constructed hull. The second was to be built on the same terms in Edwards Ferry on the Roanoke River. This ship would eventually become the *Albemarle*. The third ship was to be built by Thomas S. Howard and Elijah W. Ellis at Whitehall on the Neuse River. This final ship would eventually become the *Neuse*.

2.2 Construction of the CSS *Neuse*

Construction of ironclads proved to be a difficult task for the Confederate Navy. Essential materials such as iron were not indigenous to North Carolina. States such as Tennessee and Kentucky were rich in iron and occupied by the Union, making it difficult to ship iron to the South. It was also difficult to find prepared iron. Railroads were monopolized by the government and used for transporting troops to battle stations. With the railways unavailable, the Navy had no other sufficient means to transport materials necessary for ironclad construction.

Union soldiers controlled key locations in the South. One of the most challenging for the Confederacy was the Union occupation of the Norfolk Navy Yard. When the shipyard fell into Union hands, Confederate leaders moved the yard's production to the Charlotte Naval Yard located in Charlotte, North Carolina. Charlotte was a suitable location for building ships and the production of armaments because it was located near the intersection of major railroads in Western North Carolina. These rail lines allowed for goods and soldiers to be shipped from South Carolina and Virginia to Charlotte and from Charlotte to Goldsboro and Wilmington. Charlotte was key to supplying goods and manpower to eastern North Carolina.

Although the Charlotte Naval Yard was a great asset to the Confederacy, lack of materials caused a delay in the building of ironclads throughout the South. North Carolina desperately needed ironclads defending the coast. The state's waterways were essential for their

survival because they were the gateways to supplies and Confederate strongholds. For example, the mission of the *Neuse* was to sail down the Neuse River and defend ports such as New Bern from Union advancements.

On October 17 1862, a contract was signed between the Confederate Navy Department and the shipbuilding firm of Howard and Ellis, of New Bern, to construct the *Neuse*. According to the contract, the hull of the *Neuse* would be turned over ready for armament by March of 1863. The *Neuse* was eventually constructed in Whitehall, which was a small town that served as the ideal construction area. This was due to the fact that the location was 55 miles inland and provided protection from invading Union troops. Col. Stephen D. Pool, of the 10th North Carolina Regiment (First Artillery) noted

The river, though much narrower at White Hall, is deep and navigable. On the northern side the river has a gentle slope to a stream, which, in 1862, was bordered by a swamp in which there was a somewhat dense growth of tall timber. A quantity of this timber had been felled and cut into logs, which lay around the bank of the river. . . . A gunboat was in course of building, and stood, propped on rollers, in the upper end of the swamp, and near the river not far from the bridge . . . The little hamlet of White Hall, built on the southern bank of the Neuse, consisted of two or three stores and warehouses, and a straggling street with some neat dwellings and enclosures. The warehouses were on the bluff which is lofty on the southern side; and some eminences further from the river, and commanding the much lower level of the northern shore, gave great advantage to the former as a military position.³

The *Neuse*'s designer was John L. Porter, the Confederacy's chief ship builder, who also designed the CSS *Albemarle*, the *Neuse*'s sister ship. Although both ships had the same design, they were built in different locations. The *Neuse*'s hull was fairly simple to construct because unlike the *Albemarle*, whose materials were imported from other states, all necessary components for construction were located in Whitehall. The ship was built

³ Walter Clark ed., *Histories of the Several Regiments and Battalions from North Carolina in the Great War, 1861-1865* (Raleigh and Goldsboro: State of North Carolina, 5 vol, 1901). V86, quoted in Leslie S Bright, William H Rowland, and James C. Bardon, *C.S.S. Neuse A Question of Iron and Time* [Raleigh, NC: Division of Archives and History North Carolina Department of Cultural Resources, 1981], 6.

from wood cut in the Whitehall area and most of the timber harvested and cut into planks was yellow pine. The bottom of the hull and the lower 67 inches on each side, were covered in yellow pine planks that were 4 inches by 15 inches in dimension. Above this point on each side 4-inch oak planks were used (see Figure 2.0).

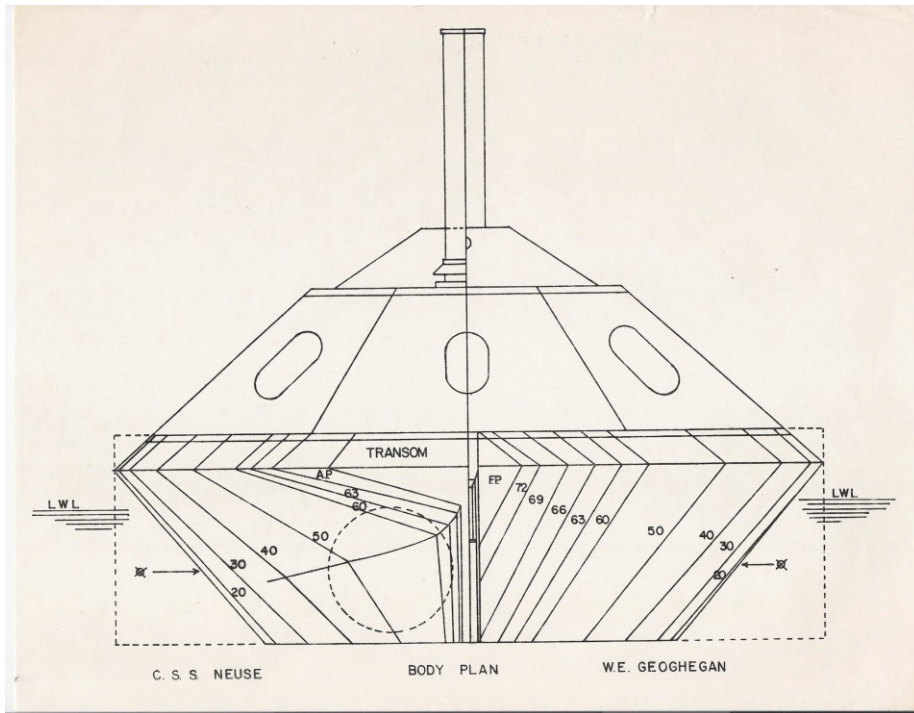


Figure 2.0 Diagram of CSS *Neuse*'s Construction⁴

The deadwood timbers at the bow were oak, as was the bow stem. The exact wood type of the stem remains unknown, but historical records suggest it was probably either live oak or white oak. Interestingly, the keelson timbers were gum, a very strong wood, but not wood normally used in ship construction. In addition to the wood components, the builders were to armor the ship with iron plating and iron spikes provided by the Confederate Navy. The estimated cost of the *Neuse* was 40,000 dollars to be paid in several installments.

⁴ CSS *Neuse* Body Plan Designed by W.E Georghegan, CSS *Neuse* State Digitized Records.

Workmen were brought in from the surrounding area to construct the ship. Several of the workers were boys who were too young to fight on the battlefield as well as men who did not qualify as soldiers due to ailment or age. Although unable to fight hand-to-hand combat, the workers who built the ship were still dedicated to the war effort. The *Neuse*'s design was a great improvement over those of its predecessors, such as the *CSS Raleigh* and *CSS North Carolina*. The *Neuse*'s hull was built to resemble a barge, with a flat bottom and straight sides. It was important that the ship have a shallow 8foot draft because it would primarily be sailing in the shallow eastern North Carolina Rivers.

The *Neuse* was 158 feet long and 38 feet wide. A series of 12 inch by 14 inch timbers attached by scarf joints make up the keelson, and chine strakes extend down the edges of the bottom of the hull. These strakes were meant to reinforce the joints between the bottom and side frames. They are also some of the few timbers in the ship that required bending. Four inch planking covered the side of the hull and was fastened onto frames with iron spikes and wooden pegs known as tunnels. Seams between the timbers were caulked with tarred cotton, a slight variation of the traditional oakum, or tarred hemp. Seams on all exposed surfaces, such as the deck, were sealed with a dark hot pitch.

The bow stem was a naturally curved timber that may have been cut from a knee of a tree or from a tree stump. Three large deadwood timbers were located behind the stem and provided reinforcement. Two of the deadwood pieces are directly attached to the keel and bow stem to provide exceptional strength at the bow. The *Neuse* would have required extra support for its bow stem because it was what was known as a ram ship. The stem was plated with iron and intended to impale any opponent in its path.

Although Whitehall provided a secluded area for the ship's construction, security was still the Confederacy's biggest challenge. The Confederate Navy stationed Lt. James Cooke to supervise the construction of the *Neuse* and *Albemarle* to insure they would be ready for battle in a timely fashion. The Union army had been conducting raids in Eastern North Carolina, and Lt. Cook was alarmed that Whitehall was a potential target. He wrote a letter to the Confederate Engineer Bureau stating his concerns. The Bureau replied,

With a sufficient force the obstructions we are now placing in the Neuse River can be defended against any force the enemy is likely to send against it. They, as well as the land defenses, will be completed, I think, in six weeks; but unless the south side of the Neuse is occupied, if the enemy possesses any enterprise at all, they will most assuredly destroy the gunboat which Commander Cooke is building at White Hall.⁵

Unfortunately, Cook's intuitions were correct.

2.3 Fosters Raid

Union General John G. Foster was on a mission marching through North Carolina in support of Burnside's attack in Fredericksburg. This expedition was one of the largest Foster led. His force consisted of 10,000 infantry, 650 cavalry, and 40 cannon. Fosters primary objective was to seize Goldsboro. His troops were expected to make the trip within a matter of days, but they were met with cold harsh weather and resistance from rebel fighters.

One of these skirmishes, known as the Battle of Whitehall, was short and fierce. Foster's men were camped just outside of Whitehall, when scouts spotted Confederates setting fire to the Neuse River Bridge. One of these Confederates was Gen. Beverly H. Robertson. In his report to the Confederate States Commanding Brigade he wrote,

⁵ Richard Rush and Others eds., *Official Records of the Union and Confederate Navies in the War of the Rebellion*. (Washington: Government Printing Office, 30 vol, 1894-1914), series I, VIII, 845 quoted in Leslie S. Bright, William H. Rowland, and James C Bardon, *C.S.S. Neuse A Question of Iron and Time* [Raleigh, NC: Division of Archives and History North Carolina Department of Cultural Resources, 1981], 7.

I left Mosely Hall, on the Goldsborough and Kinston Railroad, at 11:30 a.m., 15th instant, and, with Leventhorpe's regiment, portions of Ferebee's and Evans' regiments, and a section of artillery from [J. W.] Moore's [Third North Carolina] battalion, commanded by Lieut. [N.] McClees, proceeded to White Hall, on the Neuse River, to burn the bridge at that point and dispute the enemy's crossing should he attempt to turn our right.⁶

Confederate leaders were aware that Foster was on a mission to seize Goldsboro. Union occupation in Goldsboro would have been a great loss for North Carolina and would have contributed to the surrender of the state. The town was home to important railways and waterways that supplied Eastern North Carolina soldiers and citizens. Confederate officers were desperate to ward off a Union attack on the town and often took extreme measures, such as burning their own bridges.

When Foster learned of these events, he ordered his men to open cannon fire on the Confederate soldiers. Cannon fire lasted until dark, when the commander ordered his men to set 2,000 barrels of turpentine ablaze. The inferno lit the night sky and allowed Foster's men a clear view of the *Neuse*. This was the first time a Union officer learned of the ship's existence, and the *Neuse* along with much of its construction material was nearly destroyed by Foster's men. One Union soldier attempted to swim across the river to set fire to the ship, but was driven back by a shower of Confederate bullets. Foster's men "fired canister rounds from the southern bank of the river, but this did little except chew up the vessel's timbers. Finally, the ship was pounded by solid shot and explosive shells."⁷

The following morning Foster visited the battle site to assess damage and to continue marching his army to Goldsboro. He found that Confederate soldiers had indeed burned the

⁶ General Beverly H. Robertson, December 16, Report of Brig. Gen. Beverly H. Robertson, C. S. Army, commanding Brigade of engagement of White Hall, CSS Neuse Naval Correspondence Papers, CSS Neuse Digitized Collections, Kinston, NC.

⁷ William R. Trotter, *Ironclads and Columbaids: The Civil War in North Carolina The Coast* [John F. Blair, Publisher, 1989], 184.

Neuse River Bridge and the enemy was “strongly entrenched on the far shore”⁸. During the course of the night General Robertson formulated a plan of attack that he recalls in his report to C.S Commanding Brigade

About 9 a. m. on the 16th a brisk picket skirmish commenced. I visited the bridge, and after giving the necessary instructions went back to order up the Thirty-first North Carolina Regiment, Col. [John V.] Jordan, which had arrived during the night, and which I placed in position as much sheltered as circumstances would permit. I then posted the artillery as well as the nature of the ground would admit and ordered both shell and solid shot to be fired. For some time precious the enemy had been firing from 12 to 18 pounders, some of immense caliber. Owing to a range of hills on the white Hall side the enemy had the advantage of position. The point occupied by his troops being narrow, not more than one regiment at a time could advantageously engage him. I therefore left Leventhorpe, Ferebee, and Evans in reserve, leaving the artillery, thirty-first regiment, and two picket companies in front. The cannonading from the enemy’s batteries became so terrific that the Thirty-first Regiment withdrew from their position without instructions but in good order. I immediately ordered Colonel Leventhorpe forward. The alacrity with which the order was obeyed by his men gave ample proof of their gallant bearing, which they so nobly sustained during the entire fight, which raged with intensity for several hours after they became engaged. No veteran soldiers ever fought better or inflicted more terrible loss upon an enemy considering the numbers engaged. It was with difficulty they could be withdrawn from the field. Three times did they drive the Yankee cannoneers from their guns and as often prevent their infantry regiments from forming line in their front. In spite of the four hostile regiments whose standards waved from the opposite bank did these brave men continue to hold their ground, and finally drove the enemy in confusion from the field. More than 100 of their dead and wounded were left upon the river bank.⁹

In response, Foster sent one brigade with strong artillery support to deceive Confederate soldiers into believing that all of his men were trying to force their way across the river.

The resulting exchange was a battle fought with long-range rifles and other cannons. The two armies never fought in close combat, but both sides fought fiercely. Confederate troops suffered losses with 10 dead and 42 wounded, and the hull of the *Neuse* was badly

⁸ *Ibid.*

⁹General Beverly H. Robertson, December 16, Report of Brig. Gen. Beverly H. Robertson, C. S. Army, commanding Brigade of engagement of White Hall, CSS Neuse Naval Correspondence Papers, CSS Neuse Digitized Collections, Kinston, NC.

damaged. Foster and his men continued marching towards Goldsboro leaving Confederate soldiers to pick up the pieces of the damaged *Neuse*.

2.4 Armor, Machinery, and Weapons

The battle that would come to be known as Fosters Raid undoubtedly caused delays in the *Neuse*'s construction. In mid-March 1863, the *Neuse* was ready to be transported to Kinston where it would receive its iron plating and armaments. A skeptical Confederate engineer, Henry T. Guion, noted in his journal that "Howard and Ellis are apparently driving hard upon the gunboat and ... will finish here [Kinston] in ninety days.... I give them til Christmas—we shall see which is right...."¹⁰ The *Neuse* was floated down the Neuse River to Kinston where it was moored near the foot of Caswell Street. Later, it was moved 100 yards down river to King Street, where the water was deeper. This new site was called the "cat hole." The riverbanks adjacent to the location were steep, allowing the ship's armament and machinery to be easily lowered into the hull.

While the *Neuse* was in Kinston being fitted for armament, Lt. William Sharp was responsible for the ship's completion, and his most important duty was to procure iron for the outer casing. Without this iron, the ship could not be completed and sent out for service. Obtaining iron would prove to be the single most challenging aspect of finalizing the *Neuse* for commission. The iron used for the *Neuse* was in the form of 2 inch by 7 inch strips of wrought iron, typical armor for Confederate ironclads. The casemate was covered with 2 layers of iron, an inner layer that ran horizontally and an outer layer that lay vertically. Backing for the armor was 21 inches thick of two pine layers and one oak layer. The first was 1 foot thick with vertical

¹⁰ William Alexander Hoke Papers, *Descriptive Journal of Company B. Tenth North Carolina Artillery Regiment*, (Southern Historical Collection, University of North Carolina Library Chapel Hill, quoted in Leslie S Bright, William H. Rowland and James C. Bardon, *C.S.S. Neuse A Question of Iron and Time* [Raleigh, NC: Division of Archives and History North Carolina Department of Cultural Resources, 1981], 9.

frames, and the second was a 5inch horizontal plank. The third, outer layer was vertical 4 inch thick oak planking. Due to the Confederacy's lack of resources and difficulty in shipping goods, many ironclads did not have iron plating on their decks or below the waterline. According to original building records, the *Neuse*'s deck did not have iron plating. Additionally, the hull shows no evidence of armor below the waterline.

The *Neuse*'s armor was not produced in North Carolina, but rather was imported from outside Confederate states. Some of the iron was manufactured by the Tredegar Iron Works in Richmond, Virginia and the Scofield and Markham Rolling Mill in Atlanta, Georgia. These manufacturing plants were the closest to North Carolina that had the capability of rolling 2inch plates, and were responsible for producing armor for several other Confederate ironclads. In order to compensate for its lack of resources, the Confederacy recycled iron from old railroads. Southern mines could not produce enough ore to fill all of the military's needs. Rails were stripped from railways that had little military value and shipped to mills where they were rolled into 2inch iron plates. When it was impossible to salvage iron that could be rolled into plates, railroad T-rails were used, although, this was a recognized inferior armor.

War was escalating in the Confederacy and on January 2, 1864, General Lee directed a message to President Davis expressing an urgent need for naval backup in New Bern. He believed that the port could be recaptured, but only with the help of North Carolina's ironclads. President Davis' agreed with Lee's plan, but feared that the ships would not be ready for battle in time for the assault. Lee responded, "I regret very much that the boats on the *Neuse* and *Roanoke* are not completed. With their aid I think success would be certain. Without them, though the place may be captured, the fruits of the expedition will be lessened and our

maintenance of water of N.C. uncertain.”¹¹ Although there was a great need for the *Neuse*, its completion was significantly delayed by a number of factors including lack of manpower and resources. Iron supplies were inconsistent and slow which greatly contributed to the delay. Engineer Guion wrote in a letter, “Driving everything to complete the boat—the Gen. furnishes large detail from his brigade for common labor. I furnish good carpenters—the Navy dept. keeps the workmen waiting for materials.”¹² The armor of the ship was still in the process of being installed while the machinery and weapons were arriving which was the last portion of the ship to be completed.

Work steadily progressed in the next few months, but the ship was still far from being ready for battle. In January of 1864, machinery from Richmond began to arrive in Kinston. Little is known about the machinery used on board the *Neuse*. According to the layout of the surviving hull, it is probable that a single boiler produced steam pressure that powered two engines that turned one shaft. The shaft was located near the stern of the ship and was geared to turn two propeller shafts. This arrangement suggests that the propellers could not act independently to help maneuver the ship. Like much of the iron used for the armor, the ship’s boiler was also recycled and was most likely taken from the locomotive *Baltimore and Ohio*. No.34. According to official records, the engine was taken from Pugh’s Mill, a local saw mill located on the border of Lenoir and Craven Counties. Workmen who were experienced with machinery were recruited to help install the equipment. In addition to these specialized workmen, carpenters were recruited in an effort to hasten progress.

¹¹ R.N. Scott and Others ed. *The War of the Rebellion: A Compilation of the Official Records of the Union and Confederate Armies* (Washington: Government Printing Office, 70 vol, 1880-1901), Series I, XXXIII,1101, quoted in Leslie S Bright, William H. Rowland, and James C. Bardon, *C.S.S. Neuse A Question of Iron and Time* [Raleigh, NC: Division of Archives and History North Carolina Department of Cultural Resources, 1981], 10.

¹² William Alexander Hoke Papers, *Descriptive Journal of Company B. Tenth North Carolina Artillery Regiment*,(Southern Historical Collection, University of North Carolina Library Chapel Hill, quoted in Leslie S Bright, William H. Rowland and James C. Bardon, *C.S.S. Neuse A Question of Iron and Time* [Raleigh, NC: Division of Archives and History North Carolina Department of Cultural Resources, 1981], 13.

At the end of February 1864, the *Neuse* received its second commanding officer, Lt. Benjamin Loyall. The next two months Loyall busied himself with preparing the *Neuse* for a second offensive against New Bern. The new commander was aware that a second attack without the *Neuse* would be fruitless, and that his first priority was to prepare the ship for service. Due to the urgency of the ship's completion, on the night of March 7, 1864, the *Neuse* received its heavy armament. Work continued throughout the night in an effort to ready the ship for battle.

Two double-banded 6.4 inch Brooke Rifles were installed in the casemate. The guns were designed by John Mercer Brooke, Chief of Ordnance and Hydrography for the Confederate Navy. Cast iron was the primary resource used for producing large artillery during the Civil War. Although this material is hard, it is brittle and easily bursts under the great pressures present in rifled guns. Brooke's design was unique because it reinforced the gun by shrinking wrought-iron bands around the breech. These measures were necessary because rifling created a much greater strain on the barrel. Brooke rifles were known for their long range, durability, and accuracy, and were arguably the best-rifled artillery produced during the Civil War. These guns proved to be formidable weapons, with a range of three to five miles. The range of the guns on board ironclads such as the *Neuse* was somewhat reduced by limited elevation inside the casemate.

2.5 Orders to Sail to New Bern

Commander Loyall was beginning to doubt that the *Neuse* and its crew would see any military action. He was disheartened by the delayed shipments of iron, squabbles between the men, and the looming spring deadline for the New Bern attack. Another contributing factor was the absence of men working to finish the ship. Gen. Robert Hoke withdrew his men to prepare

for an assault on Plymouth, leaving Loyall without many of his workers. While explaining his difficulties to the navy department he stated that this “has nearly broken me up in work.”¹³ In response to Loyall’s laments, on April 22, 1864, the *Neuse* was given orders from the navy department to steam ahead to New Bern, despite the fact that the ship was not yet fully prepared for battle. It was planned that the *Neuse* would meet its sister ship the *Albemarle* in New Bern in an attempt to recapture the town from Union forces.

Much to the dismay of the ship’s crew and captain the *Neuse* ran aground on a sandbar in the bottom of the river only one-half mile in their journey. Lt. Richard Bacot wrote in a letter

I have bad news to tell you this time. Even worse than I anticipated when I wrote last week...there was scarcely enough [water] for us to cross the obstructions; we nevertheless started down last Friday and had proceeded about a half mile when we grounded on a sand-bar...The stern of the vessel is afloat, but the bow is 4 feet out of the water. We will have to wait for a freshet again...I assure you our disappointment was great when we found we could not get off: the troops were here and ready to join us in an attack on Newbern and we were all expecting to take the city and sink the gunboats without much trouble and to have a fine time afterwards...it does seem hard to be so sorely disappointed after expecting so much.¹⁴

Gen. P.G.T Beauregard, commander of the newly created Department of North Carolina, was informed of the *Neuse*’s setback, but did not feel that canceling the attack on New Bern was justified. On April 24 he telegraphed General Bragg “Can you send me an engineer officer who can contrive some plan to get the gunboat afloat? I feel she will be materially injured if not floated soon. The water has fallen 7 feet in the last 4 days and is still falling.”¹⁵ Lieutenant Bacot thought that it would be summer before the water level in the river would be high enough to lift the ship free. Many feared that the gunboat was hopelessly stranded.

¹³ Leslie S. Bright, William H. Rowland, and James C. Baron, *C.S.S. Neuse A Question of Iron and Time* [Raleigh, NC: Division of Archives and History North Carolina Department of Cultural Resources, 1981], 14.

¹⁴ R.H Bacot, April 28, 1864, Bacot to “Sis,” Bacot Papers, CSS Neuse Digitized Records, Kinston, NC.

¹⁵ Richard Rush and Others ed., *Official Records of the Union and Confederate Navies in the War of the Rebellion*. (Washington: Government Printing Office, 30 vol, 1894-1914), series I IX, 808, quoted in Leslie S. Bright, William H. Rowland, and James C Bardon, *C.S.S. Neuse A Question of Iron and Time* [Raleigh, NC: Division of Archives and History North Carolina Department of Cultural Resources, 1981], 15.

The *Neuse* was trapped in the river until mid-May before waters rose high enough to break the vessel free. Instead of sailing to New Bern, the ship settled back in the moorings in Kinston. This was due to General Lee calling troops to march to Virginia to assist in the battle against the buildup of the Union army led by General Grant. Unable to attack without ground support, the *Neuse* remained in Kinston. As the weeks marched on, the possibility of the ship seeing military action seemed less and less. One soldier stationed on board the ironclad reflected on the possible military power the ship possessed, "It is a great misfortune that we have managed so badly without the boat at Kinston. Could it have been completed a month ago and carried down the river...and the *Albemarle* come up the river we would have had easy work taking New Bern and very probably saved hundreds perhaps thousands of valuable lives."¹⁶

At the beginning of June the ironclad was finally completed. Unfortunately, without troop support the ship and crew were destined to remain inactive in Kinston. Commander Loyall grew restless with the leisurely life the *Neuse* provided. Lt. Robert Minor, overseer of the *Neuse's* construction, could sense Loyall's growing unhappiness and offered a change of duty station. Loyall heroically replied

You ask me if I desire to exchange the dullness and inactivity of this station with the stirring scenes of the James River Squadron. I will not say emphatically yes....I would not seek the exchange between the command of a vessel of this kind and of one of the old gunboats on the James River....However it is my desire to serve with all my ability, in any station it may please the Government to place me...My opinion is that the prospect of this vessel's being brought in conflict with the enemy is remote....and all things considered the ship is not a discredit to the Navy, but would be no mean adversary to our friends in the sound.¹⁷

¹⁶ Louis H. Manarin and Weymouth T. Jordan, *North Carolina Troops, 1861-1865: A Roster* [Raleigh: Division of Archives and History {projected multi volume series, 1966-}], III,206, quoted in Leslie S. Bright, William H. Rowland, and James C Bardon, *C.S.S. Neuse A Question of Iron and Time* [Raleigh, NC: Division of Archives and History North Carolina Department of Cultural Resources, 1981], 16.

¹⁷ B. Loyall, August 4,1864, B. Loyall to R.D. Minor, Minor Family Papers, CSS Neuse Digitized Records, Kinston, NC.

On August 24, 1864 Loyall received orders to report for duty on board the *Patrick Henry* in Richmond, and Capt. Joseph H. Price was named the new commander of the *Neuse*. Price was a native of Wilmington and was to be the ship's last commander.

2.6 The Battle of Wyse Fork

In late November of 1864 the *Neuse* and its crew were still stationed in Kinston, with nothing to do but wait out the mild fall rains. Union forces occupied New Bern and were conducting raids in neighboring towns. With time, Union fears of the *Neuse*'s power began to diminish and many of her crew feared an attack on Kinston. One crewmember wrote

I learned this morning that the Yankees taken [sic] Tarbor about two days ago. I want to fight the Yankees with our gunboat but they is afeared [sic] to come in shooting distance...I expect the Yankees with undertake Kinston. If they do they will take it I think, but I don't think they can take our boat east. We would die for it rather than give it up. We would blow it up rather than they should have it.¹⁸

This soldier had no way of knowing how prophetic his words were.

The new year brought the loss of the last Confederate stronghold. When Fort Fisher fell in January of 1865, Confederate troops were ordered to march to Wilmington and all hope of the *Neuse*'s engaging in military action was lost. In January, Bacot wrote in a letter:

The urgent necessity for troops and Wilmington prevents our having a land force to cooperate in an attack on Newbern. It would do my heart good to help take that place...I say fight Yankeedom forever if we have to Bushwack and line in the swamps. We've gone too far to back down and I glory in our cause....We are not yet whipped and our people are not discouraged.¹⁹

The Confederacy surrendered Wilmington on February 22, 1865. Two weeks later a Union expedition gathered in New Bern. The objective of the expedition was to join Gen. William T.

¹⁸ Jerome Riggins to Martin Moser, December 12, 1864. Martin Moser Papers (Southern Historical Collection, University of North Carolina Library, at Chapel Hill), quoted in Leslie S. Bright, William H. Rowland, and James C. Bardon, *C.S.S. Neuse A Question of Iron and Time* [Raleigh, NC: Division of Archives and History North Carolina Department of Cultural Resources, 1981], 16.

¹⁹ R.H. Bacot, January 7, 1865, R.H Bacot to "Sis", Bacot Papers, CSS Neuse Digitized Records, Kinston, NC.

Sherman's forces near Goldsboro. Two divisions departed New Bern; one led by J.D Cox had over 13,000 men. Leading Confederate forces was Gen. Robert F. Hoke, whose forces returned to Wyse Fork after the fall of Wilmington. The morning of March 8, 1865, Union forces reached Wyse Fork, but were unaware of the Confederates' presence and were quickly defeated, losing nearly 1,000 prisoners. Confederate forces moved forward about a mile and entrenched themselves facing Union forces. The Union soldiers outnumbered Confederates 13,000 to 8,000, with additional Union troops marching in from New Bern. There was a skirmish on March 9 but there were no heavy casualties. On March 10, when Union reinforcements arrived, the Confederate troops realized they were outnumbered and attempted to move around to attack Union forces at their rear, but found the Union position too strong and returned to their trenches.

That night the Confederates retreated to join General Joseph E. Johnston's army at Smithfield. During the 2 days following their retreat, Union commanders sent telegrams to New Bern requesting the preparation of a steamer with a torpedo to sail to Kinston and destroy the *Neuse*. On March 12 Union forces began marching to Kinston and, obeying orders, Confederate Commander Price opened fire on the advancing enemy cavalry and then set the *Neuse* on fire. Bacot described this moment in a letter:

All the troops had withdrawn from Kinston and the Yankees 18,000 strong came upon us and not having any prospect of being relieved before our provisions gave out and being in a narrow river where we could not work the ship under fire, after a shelling the Yankee Cavalry for a little while, we removed our powder and stores and burnt the vessel.²⁰

The fire caused a massive explosion in the port bow that caused the ship to sink before it was completely destroyed by the fire. A few days after the sinking, a Connecticut private returned to the wreck site and reported, "Weather very windy, sand flying. Visited the rebel Ram which was

²⁰R.H Bacot, March 27, 1865, R.H Bacot Letter to "Sis", Bacot Papers, CSS Neuse Digitized Records, Kinston, NC.

in the bend of the river in the woods and sunk with two large guns on board and a savoy [sic] looking craft.”²¹

At the end of the Civil War, the United States Treasury Department decided to auction the remains of the *Neuse* to a New York company in October of 1865. The following year, the company salvaged the machinery, armor plating, and guns from the ironclad. The ship sat at the bottom of the Neuse River in Kinston, North Carolina for one hundred years before further excavation took place.

²¹ Diary of Henry J.H. Tompson, March 22, 1865, Manuscript Department, Duke University Library, Durham, quoted in Leslie S. Bright, William H. Rowland, and James C. Bardon, *C.S.S. Neuse A Question of Iron and Time* [Raleigh, NC: Division of Archives and History North Carolina Department of Cultural Resources, 1981], 17.

Chapter 3.0: Excavation of the CSS *Neuse*

The *Neuse*'s naval history was short . Its most recent history, however, is complex and filled with interest. The ironclad sat at the bottom of the Neuse River for nearly one hundred years before serious excavations took place. Residents of Lenoir County, North Carolina, viewed the ship as a local treasure and took great pride in its history. The centennial of the Civil War sparked a renewed interest in the county's history. Three businessmen undertook the task of excavating the ship in hopes of selling the ironclad and associated artifacts for a profit, as well as allowing the *Neuse* to serve as historic landmark. Although their efforts were conducted with respect for the historic integrity of the ship, the project was not conducted as a formal archaeological excavation. Much has changed in the field of archaeology since the 1960's and excavation methods have improved greatly. Also, due to ownership disputes, damage to historic artifacts, and lack of training and resources encountered in private excavations such as the *Neuse*, North Carolina passed and enacted several laws prohibiting excavations that are not conducted by state employed archaeologists.

3.1 A Community Project

The local community of Kinston, in Lenoir County, has always taken an interest in the ironclad's history. The wreck site, which was visible during times of drought when water levels in the river were low, became known as "Gunboat Bend" and was a popular swimming hole for children during the summer months. Local rumor circulated that barrels of Confederate gold were on board the ship, and it was not uncommon for people to take home souvenirs from the wreck site. Serious excavations were initiated by Henry Casey in 1936. Casey lived in Kinston as a child and began digging around the ship as a young boy. He continued his efforts on his own until the 1950's when he partnered with Lemuel Houston and Tom Carlyle to

raise the *Neuse* from the river bottom. Individuals living and working in Kinston were especially fascinated by the excavation and frequently visited the site.

One community member in particular, William H. Rowland, felt a personal burden to document the events of the excavation for the historical record. Rowland hand-wrote several hundred pages, being sure to document important details of the excavation, including dates, times, individuals involved, river levels and temperatures, and weather conditions. Rowland also spent a great deal of time collecting pictures and newspaper clippings associated with the excavation and the ship's recent history. The Rowland Papers are an invaluable resource, but there are still gaps in the historical record. Mr. Rowland, although passionate, was not a trained historian and his records are written in laymen's terms. Although the records were not written by a professional, they are the only available resource in studying the excavation of the ship. Without these records historians today would find it almost impossible to research the *Neuse* excavation. All involved in the project were passionate about the ship and its history. The salvage crew sacrificed their time and resources to keep the excavation project progressing forward. The excavation proved to be a more difficult challenge and many obstacles were overcome during the process. For example, the salvage crew faced unexpected legal battles concerning ownership of the ship and associated artifacts. Also, the salvage crew was responsible for protecting the ship, once excavated, from natural elements and looters. Finally, the local community went to great lengths to fund the excavation project. Without civic clubs and historical organizations located in Kinston and the surrounding area, the salvage crew would have had no choice but to abort the project. The excavation was risky for all involved, especially the *Neuse*, but without the salvage crew, William Rowland, and the community's efforts, the ship and its history would most likely still be buried in the river.

3.2 An Historical Account

The following is a paraphrased account from the William H. Rowland papers housed in the East Carolina Joyner Library. Henry Clay Casey began digging around the old ship with a shovel as a young man in 1936. He found the work to be difficult, as the natural flow of the river quickly re-deposited sand and debris into the holes he was digging. Other life circumstances forced him to cease his project for several years, but he returned to digging in 1939. In 1940, Mrs. W.D. Pollock of Wilson, North Carolina, wrote the Army Corps of Engineers regarding the feasibility of raising the ship and moving it to a new location on higher ground. The Corps traveled to Kinston, studied the wreck site, and estimated that 20,000 dollars would be necessary to recover the sunken ship. Their report also stated that the bottom of the ship was the only portion remaining, and it did not present a problem with navigation in the river. The Corps did not have the authority to remove the vessel, and they did not think it was practical to raise the ship from the river bottom in its present condition. After this report was released, any thought of excavating the ship was forgotten.

In 1954, some local boys were swimming on the wreck site when the river was low, covering the ship in about 1 foot of water. While playing at the site, the boys recovered 14 “live” shells that weighed 100 pounds loaded and about 65 pounds empty. This find revived Casey’s interest in the *Neuse*, and in 1956, already partnered with Lemuel Houston in a pulp wood venture; he discovered that he and Houston had mutual interest in the ship and its history. On October 20, 1961, the two men estimated the ship to be about 40 feet long and 20 feet wide. Both Casey and Houston were eager to make a dollar and thus decided to undertake the task of raising the ship from the river bottom. In need of a dragline operator, Houston brought in Tom

Carlyle, who believed the ship could be recovered in 10 days. The men decided on a partnership and agreed that the profits from the venture should be divided evenly between them.

Carlyle was responsible for providing the heavy machinery needed to excavate the ship, and when the crane, today known as a backhoe, was brought in, it sat directly on top of the ship (see Figure 3.0).



Figure 3.0 CSS *Neuse* Excavation²²

The crane was used to scoop away sand from the deck of the ship. Rope was tied around exposed areas of the ship in an effort to keep visitors from walking on the decking. Sand removed from the ship was placed aside and was used to build a cofferdam to prevent water from refilling the ironclad. Once the dam was built, the crane was removed from the deck and placed on the edge of the dam and continued to remove sand and debris from the ship.

A “mud hog” pump was obtained from C.W. Dawson to remove the mud and sand from the interior of the ship. The men quickly discovered that one pump was not enough to complete the job, and a second was brought in to speed the process along. Some of the salvage crew were concerned that some artifacts were being sucked through the pumps and deposited in the river, so

²² CSS *Neuse* Excavation, Digitized Records CSS *Neuse*, Kinston, NC.

a search was on for a “sand hog”. Lloyd Humphrey came to their aid and donated a “sand hog” to be used during the excavation.

The project was becoming longer and more expensive than the men anticipated and they began to run out of resources. Thankfully, the local community contributed to their efforts. The White Owl Motor Company donated 45 gallons of fuel to run the crane. Volunteers from the community donated their time and began digging with shovels. Their hard work and generosity proved to be beneficial, as artifacts such as shells, pots, pans, and stoves were being recovered. The local Boy Scout troop became involved in the project by donating a tent to house excavated artifacts and serve as headquarters for the salvage crew.

Word began to spread about the salvage project. Visitors from out of state frequently visited the wreck site along with locals who visited almost every day on their lunch breaks and after work (see Figure 3.1).



Figure 3.1 Visitors viewing CSS *Neuse* Excavation²³

²³ CSS *Neuse* Excavation, Digitized Records CSS *Neuse*, Kinston, NC.

A cast iron pot found on board the ship was set in a strategic location and used as a donation center. It was estimated that visitors to the site donated as much as 2,000 dollars. The local Civic Club donated 500 dollars, and the Lenoir Centennial Committee paid 8,000 dollars for recovery of artifacts, 7,000 dollars for the recovery of the ship's hull, and 2,000 dollars to move the *Neuse* to its new home at Governor Richard Caswell Park.

Public opinion of the excavation was divided among local residents of Lenoir County. Rumor spread among law enforcement that the excavated artifacts and ship were potentially in danger of looters, and it was suggested that the salvage crew arrange overnight security for the ironclad. Several volunteers offered to spend the night protecting the *Neuse*, but nothing eventful happened. The majority of individuals living in the county supported the project. The city of Kinston donated a second crane to assist with the excavation. Unfortunately, for unknown reasons, the crane had to be returned after just 3 days of use. Construction companies in the surrounding area donated equipment and fuel to be used during the excavation. A clam bucket was donated to remove sand from the ship without causing damage to the hull or artifacts stored within the ship. Days before the ship was to be "floated", two men from Goldsboro came to Kinston in their motorboat to offer their assistance. Raising the ship from the river bottom would prove to be more of a challenge than anyone anticipated.

In order to raise the ship to the surface, cables were pulled under the ship and attached to 55 gallon metal drums. A total of 30 of these drums were placed inside the ship and 90 were attached to the outside decking. Finally, on December 15, 1961 at 2am, the *Neuse* once again began to float (see Figure 3.2).



Figure 3.2 CSS *Neuse* Excavation Utilizing Drums²⁴

When daylight came, it was determined that $\frac{1}{4}$ of the ship still lay buried in the sand, and the next 4 days were filled with sand removal and artifact recovery. News of the floating ship spread quickly in the town of Kinston, and word soon reached Ms. Cox, the owner of the land where the wreck site was located. Ms. Cox insisted that the ship was rightfully hers because it was on her land. The salvage crew claimed ownership because their time and resources were responsible in the recovery of the ship. A legal battle would soon ensue and was settled by paying Ms. Cox 5,000 dollars for the ship and its associated artifacts. The salvage crew paid 1,500 dollars to Ms. Cox and the remainder was paid for by involved organizations and local civic groups located in Kinston.

In the mean time, efforts were being made by the original salvage crew to remove the ship from the river to its new home in Richard Caswell Park. Erwin Futrell, a house mover, was chosen to help relocate the ship to its new resting place. Heavy steel cables were taken across the river and attached to pulleys wrapped around trees. The cables were then taken back across

²⁴ CSS *Neuse* Excavation, Digitized Records CSS *Neuse*, Kinston, NC.

the river to the ship and attached to winches on trucks. The house movers began pulling the ship, but the weight was too much for the trees to support and their roots were pulled from the ground. The men realized that pulling the ship from the river was not going to be successful and decided to leave it tied in a secure place until warmer months. The artifacts were taken to a secure location and protected, but while the ship was tied, the rushing river water re-deposited sand and other debris back inside the ship. Pressure from the water caused a portion of the decking to be washed away. Thankfully, the loose decking was able to be secured downriver close to New Bern. Not only did the water cause damage to the ship, but also the cofferdam was destroyed causing the ship to fill with water and return to its resting place at the bottom of the river. With the sinking of the excavated ship, public interest and excitement dwindled to almost nothing, and rumors began to spread that the excavation had stopped.

In 1962, another house mover, Clayton Humphrey, decided to dig up the sunken ship. He and his men began the venture, but within days the mission was quickly aborted due to their lack of resources. In the spring of 1963, Mr. D.C. Murry, another house mover, told the salvage crew he had the means to remove the ship from the river. There were many different opinions about continuing the excavation project. Some thought it would be an exercise in futility, fearing that bring up the ship for a second time would cause it to fall apart. Others thought that the ship would serve as a tourist attraction, and would be good for local business. Mr. Murry was an experienced house mover and immediately brought in 9 men, 5 winch trucks, heavy-duty cables, and a crane, and began working.

The crane was used to remove sand from the decking and around the ship, just as it had in the past. The latest work on the excavation sparked a new interest among community members and all was as if excavation never stopped. A new cofferdam was built and a pump was brought

in to remove excess water from around the ship. The pace of the excavation was quickened the second time due to fears of more anticipated inclement weather and flooding. Once the ship was brought to the surface, holes were drilled in the side of the ship for the cables to go through. These cables were then secured to the wrench trucks responsible for pulling the ship out of the water.

May 1964 was one of the most important months in the *Neuse*'s recent history because the ship was finally removed from its 100-year-old home in the Neuse River bed. Although this was a leap forward, it left the ship more vulnerable to vandals and natural elements. The salvage crew attempted to prevent such events from occurring, but nonetheless the ship sustained significant damage. Iron spikes were stolen, and a section where the rudder attached was broken along with an outer portion of the starboard deck.

Removing the ship from the river began on May 18, 1964, and took about a week to complete. The North Carolina Department of Transportation required the ship to be cut into smaller pieces for transport on the highway. Murry's crew dug sand and mud that had accumulated during the winter away by hand. A total of 13 support cribbings were placed on the starboard side of ship for extra stability, consisting of 4 inch by 6 inch by 48 inch oak sections. Seven hydraulic jacks were placed between the support cribbing to help lift the ship from the bottom of the river. For the cribbings to be installed, 1 1/8 inch diameter holes were drilled in the sides of the ship, and cables were run through the holes and secured to trucks and wrenches. After weighing the starboard side, it was determined that the ship should be cut into three pieces. Each section of the ship was planned to be about 40 to 50 feet in length. The house moving crew began cutting on the bottom decking with a chain saw. The cutting was initiated directly across from the door entering the captain's quarters. The cutting proved to be a difficult task, taking 30

minutes to cut 7 feet. The men kept hitting iron spikes and breaking the chains on the chain saws. An acetylene-cutting torch was used to cut through the difficult iron spikes, but was problematic because of the small fire it caused. Chain saws were used to cut through the wooden sections of the ship with limited and careful use of the acetylene torch.

The crew continued cutting the ship into pieces on May 19, 1964. It was noted that all involved felt badly for cutting the ship, but felt that the end justified the means. As the ship was being cut into pieces, additional cables were added to ensure the ship did not fall apart. After weighing operations were complete it was estimated that the first section weighed approximately 55 tons. While cutting the second piece, several pieces of wood about 24 inches long were removed from the area where the original explosion blew a hole in the port side. In addition to the wood, a block and tackle, 100 pieces of coal, a golf ball, a softball, slivers of metal and several nails were also removed from the ship. The following day more dirt was removed from the ship and deposited on the riverbank. The stern section was loaded on steel beams and dollies were adjusted to equalize the load. It was ready to move to the Governor Richard Caswell Park site, but with about 15 feet remaining to move from the riverbank, the left side sank into the soft ground. A wrench truck had to be used to pull the ship free (see Figure 3.3).



Figure 3.3 Wrench Truck Used to Move CSS *Neuse*²⁵

²⁵ CSS *Neuse* Excavation, Digitized Records CSS *Neuse*, Kinston, NC.

The journey to the ship's new home was slow. The route was US 70 to Vernon Street, and the total distance was about 4.9 miles. The section of the ship was placed on the riverbank-facing west.

At the wreck site, men continued digging out the rest of the ship using 5 cables attached to the second section in order to move it. The piece was not moved on the same day; the crew however, grew tired from a long day of working. Shoveling produced several nails, slivers of iron, coal, firewood, and a four-inch section of what appeared to be a bayonet, but unfortunately shattered when exposed to natural elements.

The final days of moving the ship were slow and tedious. The second section proved to be difficult to move due to its large size and the narrow street widths. On May 26, 1964, the final and third section of the ship was delivered to Caswell Park, and the ship was resectioned. During the following weeks, work was done to prepare the ship for public viewing. Beams were placed under the ship as a cradle to help support its weight. Conservation work began almost immediately. Linseed oil was chosen to coat the wood and act as a wood preservative. Tarheel Wood Treating Company in Morrisville, North Carolina was chosen to help treat the wooden hull. Pentachlorophenol was used to treat the ship for insects and to protect the wood from deterioration. Also, a fence was erected to prevent damage from vandals and to keep visitors from climbing on the wooden hull.²⁶

The coming years in the life of the *Neuse* were filled with excitement as state officials worked tirelessly to create a historic site dedicated to the Confederate ironclad. The state's initial priority was to quickly and efficiently conserve the ship and associated artifacts. Development of the conservation methods, historic site, and museum will be discussed at length in the coming chapters.

²⁶ William H. Rowland, Circa 1960, Rowland Papers, East Carolina Joyner Library, Greenville, NC.

3.3 A Cause for Change

Although the excavation of the *Neuse* was considered to be a labor of love in an active and enthusiastic community, the method and process of the excavation were cause for concern. The project was conducted by local businessmen with no training in archaeology or preservation. Their efforts were noble, but unfortunately much of the historical information that could have been gained from a proper archaeological excavation was lost. Despite the salvage crews' best efforts, vandals were responsible for looting priceless historical artifacts and for damaging parts of the wooden hull. Also, due to their inexperience, all of the remaining intact decking and interior partitions of the ship have been lost. According to historical records, some of the decking was washed away due to natural elements, rapid moving river currents, and vandals. The records do not indicate, however, the fate of the remaining decking and interior partitions.

In addition to their lack of training and loss of valuable historic information, the salvage crew faced questions concerning legal ownership of the relic. It was not until 1966 that the federal government enacted the National Historic Preservation Act, establishing state protection as well as funding for historic sites considered significant in American History. Prior to 1967, North Carolina had not passed laws regarding excavation restrictions or ownership of historic relics. Many of the legal questions surrounding the *Neuse* could not be answered by lawyers simply because there was no precedent for such cases. Excavations such as the *Neuse* prompted state lawmakers to enact legislation prohibiting private excavations and establishing ownership of all historical artifacts located on public state land to be property of North Carolina.²⁷

North Carolina's underwater archaeology branch was established in 1967 as a result of Chapter 121, Article 3, "Salvage of Abandoned Shipwrecks and Other Underwater

²⁷ North Carolina Department of Cultural Resources Division of Archives and History, Chapter 121, *Article 3 Shipwrecks and Other Underwater Archaeological Sites* [North Carolina, 1967].

Archaeological Sites.” Subsection 121-22 establishes ownership of all shipwrecks, vessels, cargoes, tackle and underwater archaeological artifacts that have been abandoned for more than 10 years and lying on the bottoms of navigable waters and ocean waters from within one marine league seaward from the Atlantic seashore extreme low watermark to be property of North Carolina. According to the North Carolina Administrative Code effective 1985, abandoned shipwrecks are defined as sunken ships, boats, and watercraft and their associated cargoes, tackle, and materials. Furthermore, underwater archaeological artifacts are defined as those materials showing human workmanship or modification, and having been used, intended to be used or consumed by humans. This includes relics, monuments, tools, fittings, utensils, instruments, weapons, ammunition, and precious materials such as gold, silver bullion, jewelry, pottery, ceramic, and similar or related materials.²⁸

These clearly defined parameters of underwater archaeological material have given the North Carolina Department of Cultural Resources (NCDCCR) authority to be custodian of shipwrecks, vessels, cargoes, tackle and underwater archaeological artifacts to which the State has ownership. The department may also adopt rules necessary to preserve, protect, recover, or salvage any or all of these properties. The department is also authorized to establish a professional staff for the purpose of conducting or supervising the protection, preservation, and systematic underwater archaeological recovery of materials as defined above. The Underwater Archaeology Unit (UAU), Office of State Archaeology, and State Historic Preservation Office are under the jurisdiction of the North Carolina Department of Cultural Resources.

To prevent private excavations such as the *Neuse* project, NCDCCR has license to conduct exploration and recovery or salvage operations and regulate private excavations. Persons

²⁸ North Carolina Department of Cultural Resources Division of Archives and History, North Carolina Administrative Code [North Carolina, 1989].

wishing to conduct any type of exploration, recovery, or salvage operation in which an abandoned vessel or its contents are removed, displayed, or destroyed, are required to make an application to NCDCCR and obtain a permit or license to conduct such operation. Licenses shall be granted to those cases in which the state deems as in the best interest of the state. Parameters of the license may include payment of fees to the department, delivery of some or all relics to the custody of the department, and selling or trading of some or all relics by the licensee or department. Applicants wishing to obtain a license are subject to a criminal record check, and or fingerprint analysis. Refusal may constitute grounds for the department to deny a permit or license. All state law-enforcement agencies are empowered to assist the department in carrying out its duties, and violation of Chapter 121 Article 3 is grounds for arrest that may result in a misdemeanor.²⁹

3.4 Archaeology Today

Archaeology is an ever-growing field that studies the meaning of objects in context to a historic site. Much like history, archaeology has progressed into a professional and academic field. Most historians agree that the “first archaeologist” was Nabonidus, the last king of the neo-Babylonian Empire. He was a zealous worshiper of Babylonian gods and he was compelled to rebuild the ruined temples of ancient Babylon. To accomplish his mission, he studied the ancient temple foundations for inscriptions of earlier kings. Although Nabonidus would not be considered an archaeologist by today’s standards, he remains an important figure because he studied at the physical imprints of antiquity to answer his questions about the past.³⁰

Archaeology developed into a field that was primarily interested in learning classic history through studying ancient artifacts. It was not until Great Britain established American colonies

²⁹ North Carolina Department of Cultural Resources Division of Archives and History, Chapter 121, *Article 3 Shipwrecks and Other Underwater Archaeological Sites* [North Carolina, 1967].

³⁰ David H Thomas, *Archaeology: Down to Earth*, 2nd ed. [Harcourt Brace College Publishers, 1999] Chapter 1.

that the field became interested in another branch of prehistoric studies, New World archaeology. This branch quickly became associated primarily with the study of living Native American people. These developments led to what historians call today Americanist archaeology, a term used to describe modern archaeology that is practiced all over the world.³¹

Americanist archaeology developed from a genteel pastime into a more specialized discipline that today requires extensive training in ethnology, classification, excavation, geology, and the philosophy of science. Thomas Jefferson and C.B Moore were pioneer Americanist archaeologists. Although they lacked formal anthropological training, they applied sound principles of scientific research to learn about the New World's ancient past. Men such as Nels Nelson, A.V "Ted" Kidder, and James A. Ford are considered to be archaeological forefathers, being the first to receive accredited degrees in anthropology and archaeology. These men worked during the early twentieth century and focused their studies on ancient culture in North and South America.³²

The latter portion of the twentieth century saw the gradual evolution of Americanist archaeology. This change has been attributed to men such as Walter W. Taylor in the 1940's and Lewis R. Binford in the 1960's. They were known as archaeology's "angry young men" because they urged their peers to rely strongly on their anthropological training in an attempt to define the working processes attributed to the archaeological record. They were strong advocates for using scientific theory and methods in their research and claimed that archaeology had been too simplistic in the past. Binford is especially known for the phrase new archaeology due to his insistence on using scientific methods as a contribution to general anthropological theory. The

³¹ *Ibid.*

³² *Ibid.*

progression of anthropology and archaeology has resulted in a modern, scientific field used to bring historical sites back to life.³³

It is important to note that underwater archaeology developed as a branch under Americanist archaeology. As the archaeology field progressed and became more professional, some developed expertise in various aspects and terrains in archaeology. Underwater archaeology is fundamentally the same as terrestrial archaeology in theory and practice. Archaeologists working at underwater sites should approach excavations with the same attitude toward the contextual evidence as those who work on land. Underwater archaeology should not be confused with underwater salvage. Archaeology is the collection of information; salvage is the collection of material for its monetary value. The crew that excavated the *Neuse* should be considered salvagers not armature archaeologist because they were interested in excavating the ship and its artifacts for monetary gain.³⁴

During the excavation of the *Neuse*, the archaeology field was being dominated by men such as Walter Taylor and Lewis Binford. Many changes were taking place in excavation theory and method. Due to the changing nature of archaeology, modern archaeologists often study past excavations with a heavy heart, realizing that new technologies could have offered greater opportunity for more precise and less damaging excavation methods. Such is the case with the *Neuse* excavation. Although the salvage crew did not have proper anthropological or archaeological training, they were also limited by technologies and excavation theories of their time. Had the excavation had taken place in 2013; the process would have been conducted differently, with a focus on archaeological study.

³³ *Ibid.*

³⁴ Amanda Bowens, ed., *Underwater Archaeology: The NAS Guide to Principles and Practice*, 2nd ed [UK: Blackwell Publishing, 2009].

The first step in an underwater excavation is typically locating the wreck site within a body of water. A variety of techniques are used in searching for shipwrecks or other underwater excavation sites. For the excavation of the *Neuse* it was not necessary to employ search techniques due to its local history. Members of the Kinston community knew where the ship was located, and even named the site “Gunboat Bend”. During periods of low water, portions of the ship were exposed, making it easy to locate. Since underwater search methods were not necessary, the next step in the project, conducting an underwater survey, records every detail of the wreck site. Initial surveys, called assessment surveys, are imperative to underwater archaeologists because they provide a rough idea of the extent of the layout of a wreck site as quickly and efficiently as possible. The purpose of an archaeological survey is to document how the site changes throughout the excavation process. Several surveys are conducted throughout the excavation process to monitor the integrity of the work site. Also, because the study of archaeology relies heavily on contextual clues, it is imperative to document everything in case of a major loss of physical information. All archaeological excavations operate with a strong emphasis on scientific theory. Archaeologists excavate small sections at a time, and establish a coordinate system that allows them to work systematically. Coordinate systems also allow for greater accuracy in record keeping. By working in small sections, archaeologists ensure their work is thorough with no lost information.³⁵

Today, an important part of any excavation is obtaining the proper permits and licenses from the NCDCCR. If the department deems the excavation to be in the best interest of the state, a team of archaeologists will visit the site to determine the potential for successful excavation.

³⁵ Amanda Bowens, ed., *Underwater Archaeology: The NAS Guide to Principles and Practice*, 2nd ed [UK: Blackwell Publishing, 2009].

The *Neuse* would have been deemed a high potential area because it is a known archaeological site with a charted wreck of historic age.

Next, the department reviews the project specifications for size and impact. There are two classifications in which sites can fall. The first, major bottom disturbing activities, includes project construction by major government land developers, such as the U.S Army Corps of Engineers, and the North Carolina Department of Transportation. The second category, minor bottom disturbing activities, includes private or small construction projects. The goal of classifying potential archaeological sites into these two categories is to determine if significant archaeological remains would be affected by a construction site.

The department considers both the potential, as well as size and impact specifications before moving forward with an underwater archaeological excavation as well. Finally, the department makes recommendations on the feasibility of the proposed project. Recommendations can range from “no comment” to a “yes comment”. “No comment” recommendations are given to those sites in which the department deems not in the best interest of the state. “Yes comment” recommendations are given to sites that are determined to be major bottom disturbances in areas that hold high potential for containing unknown archaeological resources. It is difficult to determine what today’s decision concerning excavating the *Neuse* might be.

Considering the current economic condition of North Carolina and the time and resources necessary to conduct a proper archaeological excavation, NCDCCR would most likely determine that excavating the *Neuse* would not be in the best interest of the state. For the purpose of this

thesis, we will assume that the department would have granted permits and licenses to excavate the ship.³⁶

The second step of the excavation process is to plan the logistics of the project. Planning should begin with a preliminary site report including details on the history of the site, previous excavation work, justification for the project and a methods statement. This information is vital not only for those directly involved in the excavation, but also for state agencies granting permits, and organizations providing financial backing. The next step in planning is to ensure that the project is properly funded and obtains all the necessary equipment before excavation work begins. Lack of proper resources during the salvage of the *Neuse* resulted in damage to the ship and loss of time and resources to those involved. Time and budgeting are imperative to a successful excavation project. Finally, considerations should be in place for the artifacts post excavation. This is the most critical time for newly excavated artifacts, and without proper treatment the integrity of the artifacts can be compromised or lost. The original salvage team put the *Neuse* in an extremely compromised situation by beginning excavations before knowing who would buy the ship and artifacts, and how they would be stored and cared for during the excavation. Serious complications arose due to this lack of planning. Vandals often stole artifacts from the site, and the wooden hull suffered immense damage by poor treatment during and after the excavation. Much of this destruction could have been avoided with proper planning.

Once excavators have obtained proper permits and licenses, thoroughly planned their project, conducted scientific surveys, and recorded all information, the next step is beginning the

³⁶ North Carolina Department of Cultural Resources, *North Carolina Underwater Archaeology Branch Environmental Review Procedures*, prepared by Mark Wilde-Ramsing, Staff Underwater Archaeologist and Richard W Lawrence, Deputy State Archaeologist-Underwater, February 2004, [http://www.archaeology.ncdcr.gov/narch/UAB/pdf Files/environment](http://www.archaeology.ncdcr.gov/narch/UAB/pdf%20Files/environment) (accessed March 29, 2013).

excavation. As stated previously, the major difference between salvage and archaeology is that archaeology focuses on academic study of artifacts as they relate to the context of the site, while the primary goal of salvage is monetary gain. According to the historical record found in the Rowland Papers, the original salvage crew spent little to no time studying the artifacts as they related to the context of the ship; neither did they study the remaining hull.

If the excavation were conducted today, archaeologists would painstakingly excavate the site layer by layer. Two major types of equipment for removing sand and other debris, otherwise known as spoil, are used in modern excavations. The airlift and water-dredge both act as underwater vacuums. The original salvage crew employed “mud hogs” and “sand hogs” to remove unwanted water and spoil in addition to a cofferdam. These pumps were used for the same purpose as today’s vacuum lifting methods. The original crew, however, did not utilize this equipment to save any spoil removed from the wreck site. Retaining spoil for further study is necessary in the event small artifacts such as buttons or beads were missed by the filter. The original crew simply dug in the spoil until they found an artifact. Today’s archaeologists dig in layers and are careful to document the findings of each layer.

The way in which artifacts were retrieved from the river would be conducted differently as well. For example, original salvagers retrieved artifacts bare handed, with no support system for the fragile artifacts. In modern excavations, archaeologists carefully wrap and support fragile artifacts before lifting them from the site. This ensures that the artifacts are protected from the moment they are removed from the ground.³⁷ Lifting the ship from the riverbed would be conducted differently as well. While the ship would still most likely be separated into sections before removal from the riverbed, it would not have been abrasively cut and acetylene torches

³⁷ J.M. Cronyn, *The Elements of Archaeological Conservation* (New York: Routledge, 1990) 5.

would have been avoided. Instead of these techniques, archaeologists would most likely have attempted to break the wood naturally to section the ship. This technique would have allowed for a more seamless fit when the ship was resectioned. While the original salvage crew was careful to make sure the ship was secured and supported during the removal, in today's excavation, archaeologists would have avoided drilling holes for cables, choosing to use removable supports and less invasive measures to support the ship.

Finally, after the ship and artifacts were successfully excavated from the bottom of the river, archaeologists would have ensured that the relic and artifacts were properly conserved, stored, curated, and studied. A major aspect of archaeology is the study of artifacts and how they relate to past cultures. In modern excavations, findings would be made public and published in peer review journals. Conservation is another concern of archaeologists after artifacts have been excavated. Although the *Neuse* and its artifacts were treated by professional conservators, it was not until the state claimed ownership of the ship that conservation became a major concern. Due to the lack of planning before excavation began, conservators found it difficult to conserve all of the artifacts and the ship before extensive damage occurred. Also, they were operating under significant time and resource limitations. Conservation of the ship's hull and artifacts will be discussed at length in the following chapters.³⁸

The recent history of the *Neuse* is interesting, and it has much to offer archaeologists, conservators, and historians alike. The original excavation is a fascinating case study into private excavations before state or national law prohibited such projects. Although the original excavation did not meet today's professional standards, it is evident that the men and community responsible for excavating the ship had a deep appreciation for its life and history. Without

³⁸ Amanda Bowens, ed., *Underwater Archaeology: The NAS Guide to Principles and Practice*, 2nd ed [UK: Blackwell Publishing, 2009].

them, the ship would most likely still be in its resting place at the bottom of the Neuse River, and today's society would be missing a very important part of North Carolina Civil War history.

Chapter 4.0 Analysis of CSS *Neuse* Wooden Hull

The *Neuse* was excavated from the Neuse River and brought to its new home, Caswell Park, in 1964. The excavation was conducted by three salvagers with no previous experience in recovering artifacts. Due to their lack of training, the ship sustained significant damage during its excavation. The wooden hull had been waterlogged in the Neuse River for 100 years, and while in the river, the wood's natural resins and sap were leached out and rinsed away. Once dried, this lack of sap and resin and the utilization of water to support the wood cells caused the wood to shrink and become very brittle. During the excavation, several legal battles took place to determine ownership of the *Neuse*. North Carolina acquired the ship in the late 1960's when conservation was in its infancy in the United States. Original conservation methods directly impacted the fate of the wooden hull. Today, the wood is very fragile, and this research aims to determine levels of degradation and effects of past treatments. Also, by examining the wooden hull with scientific measures, decisions can be made on how to best conserve the ship in the future.

4.1 Brief History of Shipwreck Conservation

Shipwrecks and underwater archaeology have been of great public interest for many years, especially with the progression of technology and communication. Major shipwreck archaeology projects began in Europe with vessels such as the *Vasa*, a Swedish warship that sank during its maiden voyage. Much like the *Neuse*, the *Vasa* was excavated and raised in 1961. Methodology for the excavation, however, was drastically different. The *Vasa* was excavated by Anders Franzén, an engineer and wreck researcher, who studied famous shipwrecks such as the *Vasa* for many years. With the aid of the Swedish navy and Neptune Salvage Firm, Franzén raised the ship from its underwater grave. The ship was raised in stages and patched and

reinforced before its final lift to dry dock. During its time in dry dock, the ship was sprayed with ocean water to ensure the wooden hull did not shrink due to air-drying. Also, seven months after the salvage, the Wasa Shipyard opened as a provisional museum where conservation took place.³⁹ Raising the *Vasa* was a unique experience because the entire hull was excavated in one piece, unlike the hull of the *Neuse* that was excavated in three pieces.

Conservators working on the *Vasa* knew that when waterlogged wood is allowed to air dry, severe shrinking, cracking, and bacterial decay could occur. In an attempt to prevent this fate, conservators chose to treat the ship with a synthetic polymer called polyethylene glycol (PEG). Typically PEG is used to conserve small objects that can be treated in tanks. However, it was determined that the only option was to spray PEG over the ship. Initially, the work was done by hand and was very time consuming. In 1965, a more effective method was developed when an automatic spray system was installed. Boron salts were added to prevent micro-organism growth and neutralize acids. Various types of PEG were tested throughout the years, and molecular weights include PEG 4000, 1500, and 600 have been used to treat the ship. The PEG treatment was allowed to saturate the ship's hull and was collected in large tanks and re-used in future treatments. The spray treatment lasted 17 years followed by another 9 years of controlled air-drying. A final surface layer of PEG 4000 was applied to protect the hull against physical harm. Although conservation of the *Vasa* began as a large experiment, the pioneering research paved the way for numerous other shipwreck excavation and conservation projects around the world.⁴⁰

³⁹ The Vasa Museum, *The Ship: The Salvage*, <http://www.vasamuseet.se/en/The-Ship/Life-on-board/>, (accessed, May 22, 2013).

⁴⁰ The Vasa Museum, *Vasa's Conservation: The Hull*, <http://www.vasamuseet.se/en/Preservation--Research/Conservation-1962-1979/The-Hull/> (accessed, May 22, 2013).

Due to excitement surrounding excavations such as that of the *Vasa*, there was an increase in hulled vessels being excavated in the United States. The 1960's especially saw an increase in excavation projects in North Carolina, and the North Carolina Department of Archives and History constructed a conservation facility located in Fort Fisher in 1963. As funding became available, additional staff was hired at the newly constructed conservation lab, but conservators were still forced to operate with severely limited resources. Along with limited resources, conservation treatments were largely experimental, as conservation was a developing field during the mid 1960's. State conservators relied on texts such as Plendrelleith's *Conservation of Antiquities and Works of Art* to conduct early projects such as the *Modern Greece* among others⁴¹. The *Neuse* was treated by conservators' employed at Fort Fisher and is of particular interest as it was the only ship to be continually treated with linseed oil.

Linseed oil is an organic substance that is obtained from the flax plant. To produce the oil the flax plant seeds are dried and then cold pressed, this method is similar to production of olive oil. The oil is heated and combined with minerals to produce a drying oil, which have been used in art and conservation for hundreds of years. Linseed oil treatments have historically been used as a binding agent in paint, and also as furniture varnish to act as a preservative.

4.2 Conservation History of the CSS *Neuse*

Leslie Bright, employed by the North Carolina Department of Cultural Resources, was the lead conservator responsible for treating the *Neuse*. Bright and his team were rushed to complete the conservation project due to lack of time and resources. Treatment of the *Neuse* was experimental and not intended to be a lasting treatment method for the ship's hull. Conservation

⁴¹ Richard Lawrence, "Forty Years Beneath The Waves: Underwater Archaeology in North Carolina,"(2006).

notes kept during the project highlight only essential information, leaving future conservators questioning some treatments and conclusions.

The conservation process began when the ship arrived in Caswell Park. It was mounted on oak supports and pressure washed to remove sand, mud, and other debris. According to the historical record, the Tarheel Wood Treating Company from Morrisville, North Carolina, was responsible for the first chemical treatment of the ship. It was treated with a 5% solution of pentachlorophenol and polyethylene glycol. Two applications of this solution, consisting of 1500 gallons, were sprayed directly on to the wooden hull. This treatment was intended to prevent attack by wood-eating insects. It was not successful, however, at preventing further deterioration. As the wooden hull dried, it continued to shrink and large sections began to delaminate. The partial structure covering the ship was not enough to protect it from natural elements, and it became apparent that further treatment was necessary. At this point that state conservators assumed responsibility of the ship's treatment.

To determine the best possible treatment method, blocks of wood were selected from various portions of the ship for analysis. Testing revealed that the wood had reached an extent of 25% deterioration. It was determined that although the surface of these samples appeared relatively dry, the core contained a large quantity of moisture. Bright and his team considered possible steps to prevent further deterioration and determined that impregnation with a synthetic material seemed to be the most logical treatment. In his report, Bright stated that the synthetic material should meet the following specifications:

1. Penetrate well enough to reach all affected areas.
2. Be an insecticide or be able to combine with an insecticide.
3. Protect against efflorescence and disintegration.

4. Resistant to weather—evaporation, moisture, stress from temperature, ect.
5. Versatile enough to allow additional treatment if necessary in the future.⁴²

In order to find a suitable match, Bright experimented with four treatment methods. The first and second were polyethylene glycol (PEG) 4000 in a heated aqueous solution as well as in an ethyl alcohol solution. The samples were first cleaned with brushes, air blasted, and vacuum cleaned to remove foreign debris. Next, the specimens were sprayed or swabbed thoroughly with both 25% solutions of PEG 4000. The samples were allowed to dry for three days when a second application of 50% PEG solution was applied. After drying and weighing, it was determined that PEG would be a suitable material for impregnating the hull of the *Neuse* providing that a protective coating were applied to the surface of the ship to prevent blowing rain and moisture from dissolving the PEG and allowing it to leach from the wood.

The second experimental treatment was raw linseed oil. The samples were cleaned in the same manner as those treated with PEG. They were then sprayed with 5% Woodtox® in mineral spirits, and allowed to dry for three days at room temperature. Next, they were sprayed with a 50% solution of raw linseed oil and mineral spirits and allowed to dry for another three days. Finally, they were brushed or swabbed with full strength raw linseed oil and allowed to dry for two weeks. After drying and measuring, it was determined that the raw linseed oil offered an exceptional ability to penetrate wood fibers, especially in a diluted state. Bright noted that linseed oil was easy to apply and was fairly inexpensive, while having properties to combine with insecticides such as Woodtox® or pentachlorophenol.

The final experimental treatment considered was Hydrozo®, a commercial wood sealant. As with the previous experiments, the samples were cleaned before beginning treatment. A

⁴²⁴² North Carolina Department of Archives and History: Raleigh, North Carolina, Leslie S. Bright, *Experiments on Impregnating Water-Logged Wood from the 1964 Shipwreck, C.S.S. Neuse*, October 2, 1969.

liberal coating of full strength Hydrozo mixed with 5% pentachlorophenol was applied and allowed to dry for two weeks. After drying and weighing, it was concluded that this treatment alone would not serve as a suitable material for impregnating the wooden hull of the *Neuse*.⁴³ Based on these experiments, raw linseed oil was chosen to treat the ship.

Test results indicated that the entire surface area of the ship would require treatment. To determine quantities of materials, needed the surface area of the ship was calculated. It was determined that the wood would retain an average of one quart of linseed oil per ten square feet of surface area. Plans for application were as follows:

- First application- 50% linseed oil with mineral spirits
- Second application- 50% linseed oil with mineral spirits
- Third application-100% linseed oil

The surface area of the hull was estimated to be approximately, 15,000 square feet; therefore, 400 gallons of linseed oil would be necessary for treatment. The conservator's first task in treating the hull of the ship was to clean the surface of the wood. Small vacuum cleaners and air compressors proved to be ineffective, and therefore a large commercial air compressor was employed. A piece of pipe one-half inch thick was attached to the compressor hose, allowing penetration into the ships cracks and crevices. A total of nine days was spent by three workers to thoroughly clean the ship.

Once the ship was clean of debris, conservators focused their attention on the ships iron spikes and pins. Bright made the decision to treat only the exposed areas of the spikes and pins, since their removal would jeopardize the integrity of the ships structure. Experimentation was

⁴³ *Ibid.*

completed on the metal parts to determine the best treatment method. Once the experiments were complete, the following steps seemed to be the most practical treatment:

1. Each of the metal spikes and pins was given a sharp blow with a flat-faced hammer to loosen flakes and particles of rust.
2. Electric drills, with course cup brush attachments, were used to remove scale and rust particles.
3. Manganese-Phospholene #7 was brushed on all exposed metal to complete the rust removal. Dissolved rust was wiped away with a clean cloth after the application. Two hours were allowed for the rust remover to dry before the protective coating was applied.
4. Prepared metal parts were coated with Dimetcote #4. Care was taken to prevent runs or dripping. Four weeks were allowed for the coating to cure.⁴⁴

Once the treatment of the metal pieces was complete, the next step was to treat the wood with linseed oil. A centrifugal pump was selected for the application. This type of pump was commonly used on farms for spraying insecticides and proved to be effective in spraying linseed oil. The first application consisted of 100 gallons of linseed oil, 100 gallons of mineral spirits, and 20 gallons of 40% pentachlorophenol. The solution was applied at approximately one gallon per 70 square feet of surface area. Portions of the ship which appeared to be extra dry received a larger quantity than other areas which appeared to be in better condition. Conservators allowed one week for evaporation of the excess mineral spirits before applying a second coat, which was applied in the same manner as the first. The third application was begun after waiting two weeks for the linseed oil to penetrate and the mineral spirits to evaporate. The application consisted of 200 gallons of pure linseed oil. Nine weeks were allowed for maximum penetration of linseed

⁴⁴ North Carolina Department of Cultural Resources, Leslie Bright, *Preservation of the Neuse*.

oil and evaporation of mineral spirits, and then the ship was sprayed with 30 gallons of wood sealer diluted with 25% mineral spirits.

In his report, Bright noted that in many cases no “fool-proof method”⁴⁵ of preservation could be found or financially afforded and that sometimes temporary measures need to be taken until a permanent treatment could be found. This was the case with treatment of the *Neuse*. He recommended that the linseed oil treatment should stabilize the ship for about ten years before additional treatments would be required. He also suggested prohibiting visitors from walking on the interior of the ship, and enclosing the *Neuse* in a permanent structure where temperature and humidity are kept constant. State employed conservators continued the linseed oil treatment and vacuuming periodically every few years until at least 1994, when the decision was made to switch to Timbor®. This decision came after Nancy Davis, a state conservator, published a general conservation assessment of the *Neuse*. In her report, she concluded that the linseed oil treatments had not been effectively penetrating the wood, and that fungal growth was responsible for further deterioration of the ship. Timbor®, a commercial insecticide, fungicide and wood preservative, was then used to treat the vessel. It was meant to protect against fungal decay and wood destroying insects. Another purpose of the chemical was to leach out any linseed oil remaining in the wood. It was a white powder, soluble in water, and could be purchased fairly cheaply. Due to lack of current conservation records, at this time it is unclear what application methods and concentrations of Timbor® were used to treat the ship. The ship was vacuumed most recently during the summer of 2012 in preparation for its move to the *Neuse* Civil War Interpretive Center in downtown Kinston, North Carolina.

4.3 Analysis

⁴⁵ *Ibid.*

The primary objective in the analysis of samples from the *Neuse* was to determine the condition of the hull. This was accomplished by utilizing scientific methods to provide a baseline of research for future studies. In order to conduct this research analytical resources were utilized at East Carolina University. Fourier Transform Infrared (FTIR) Spectroscopy in the Department of Chemistry and Scanning Electron Microscopy (SEM) in the Department of Biology were employed to answer research questions concerning the archaeological wood of the *Neuse*. The process of analysis for archaeological wood, particularly the *Neuse*, can be varied due to inconsistencies between samples and the nature of wood chemistry. Also, the method of previous treatment and exposure to environmental factors can result in variations, even in samples that were taken from similar locations. The samples examined provided a visual basis for the condition of the hull and a qualitative understanding of the presence of multiple organic compounds, most importantly linseed oil and Timbor®.

Linseed oil is known as a drying oil, which is oil that “is able to ‘dry’, that is to say polymerize to a semi-solid. Only if it has a sufficient content of di-or tri-unsaturated fatty acids in the make-up of its component triglycerides.”⁴⁶ Such oils can theoretically dry when there is a presence of 66% linolenic acid. Linseed oil is a mixture of unsaturated fatty acids, containing linolenic, oleic, linoleic, palmitic and stearic acids, and the presence of linolenic acid is primarily responsible for linseed oil’s ability to polymerize. Timbor® was another product that was important to this research. Timbor® was used as the second type of conservation treatment of the ship and is a commercial fungicide, insecticide, and wood protectant. Both products were obtained locally in an effort to secure conservation materials in the same manner as the original

⁴⁶ Mills S, John, White Raymond, *Organic Chemistry of Museum Objects* [Butterworth Heinemann Publishing, 1999], 36.

conservation team. The samples of linseed oil and Timbor® were used as standard samples to compare results.

4.4 Samples

Samples were collected from the *Neuse* in early February 2013, after its relocation to the newly renovated interpretation center and museum in downtown Kinston. Sixteen samples were collected from the ship at various sites with their primary objective being to determine the effectiveness of past conservation treatments. Locations for sampling were based on unique visible features, and represented similar areas of interest along the 158-foot length of the ship. The most important set of samples (Sample 4 through Sample 8) were taken with a forestry corer from timber number 4 located within Bay 5 on the port side of the ship (see Figure 4.0)



Figure 4.0 Morris Bass Sampling Wood from CSS *Neuse*

The samples were labeled according to their orientation within the core. For example, Sample 4 was located closest to the exterior of the ship and Sample 8 was located closest to the interior of the ship (see Figure 4.1).

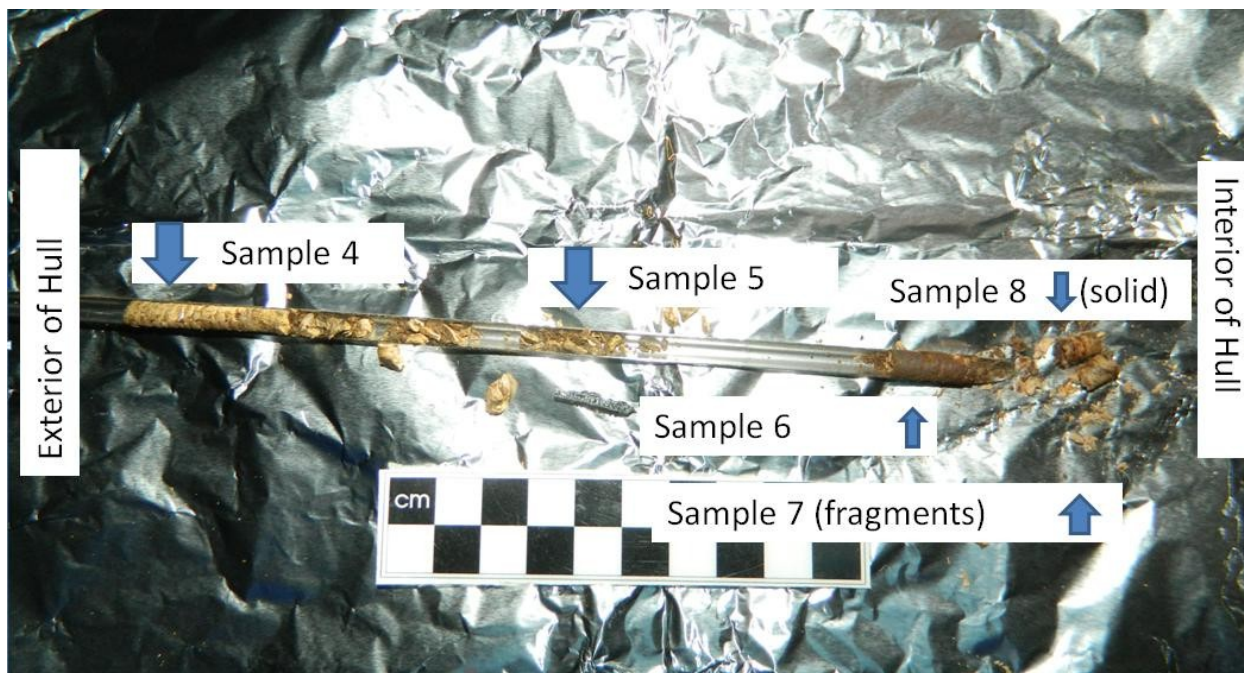


Figure 4.1 Core Wood Sample Orientation

The orientation of the samples was maintained as accurately as possible, and they were further separated and labeled according to their position within the core. The samples were divided into two sets (set A and set B). Set A was used in the SEM, while set B was used with the FTIR.

The entire core sample ranged from light to dark brown and red in color, with several areas of variation in color and consistency. The surface of the wood had a pH of 3 to 3.5 measured with ColorpHast® pH strips. This pH is lower than what is typically expected from waterlogged archaeological wood, and could be due to chemical reactions within the wood as well as the presence of natural acids such as tannic acid from the Neuse River.

4.5 Fourier Transform Infrared Spectroscopy Method

Fourier Transform Infrared (FTIR) Spectroscopy was employed to analyze the presence or absence of linseed oil and Timbor® within the wood samples collected from the *Neuse*. Also, FTIR was used to possibly identify depth of penetration of previous conservation treatments. Infrared spectroscopy uses infrared radiation to determine chemical composition and analyze materials. If a molecule absorbs infrared radiation then the bonds in the molecule undergo vibrational transitions. The spectrometer can measure the light absorbed and hence the vibrational frequencies of the molecules. Each chemical compound has a very specific identifying vibrational frequency that can be measured. Even minute differences in chemical composition will result in a different absorption spectrum. In order to prepare the *Neuse* samples to undergo spectroscopic analysis they were ground into a fine powder using a mortar and pestle. They were then pressed between a sapphire anvil and a diamond crystal, ensuring intimate contact between the wood and the crystal. The powdered samples were then analyzed using a single bounce Attenuated Total Reflectance (ATR) unit with a diamond internal reflection element. A total of 65 scans were collected for each spectrum on a Nicolet 6700 spectrometer using a DTGS detector. Finally, in order to obtain a cleaner, easier to read spectra, the spectra were straight line corrected in the region of 2000-2500cm⁻¹ and normalized.

4.6 Scanning Electron Microscope Method

To conduct microscopy for this research project, a FEI Quanta 200 Mark 1 Scanning Electron Microscope with an Oxford Inca x-act Energy Dispersive (EDX) Microanalysis Elemental detector was used for imaging the wood samples collected from the *Neuse*. The SEM is a microscope that uses electrons instead of light to form an image. The scanning electron microscope has many advantages over traditional microscopes, including a large depth of field, which allows more of a specimen to be in focus at one time. The SEM also has much higher

resolution, so closely spaced specimens can be magnified at much higher levels. Because the SEM uses electromagnets rather than lenses, the researcher has much more control in the degree of magnification.

In order to prepare the samples for the scanning electron microscope, the samples were broken into smaller subsections. For example, Sample 4 was broken into 4a, 4b, 4c, and 4d. This was done to give a clearer picture of chemical penetration. Each of these new subsamples was mounted on a platform and photographed using a small high-powered microscope. These pictures provided researchers with color images of the wood samples, and revealed the amber colored resin that was coating some of the wood samples. After the samples were properly mounted, they were placed in the SEM under low vacuum and pictures were taken. Also, the samples underwent X-ray microanalysis to determine the elemental make up of the wood.

4.7 Fourier Transform Infrared Spectroscopy Results

First, before wood samples were tested, standards for linseed oil and Timbor® were measured. Areas of interest are marked with stars. It should be noted that in all spectra the region between 2500 and 1900 wavenumbers are not displayed for clarity. This area is where carbon dioxide and other atmospheric gases appear on the spectra. It is considered to be standard to remove this section if it contains no useful information. The largest peak is set to an absorbance of 1, so the peak ratio's are used here as well for comparison. Also, there are two regions on a spectrum, the functional group and the fingerprint region. The functional group can tell researchers about the classification of a chemical, but the fingerprint region provides specific details about the chemical composition of a sample. For this reason, only the fingerprint regions have been included in this research. Results from the spectrometer are as follows:

Figure 4.2 FTIR Standard for Linseed Oil

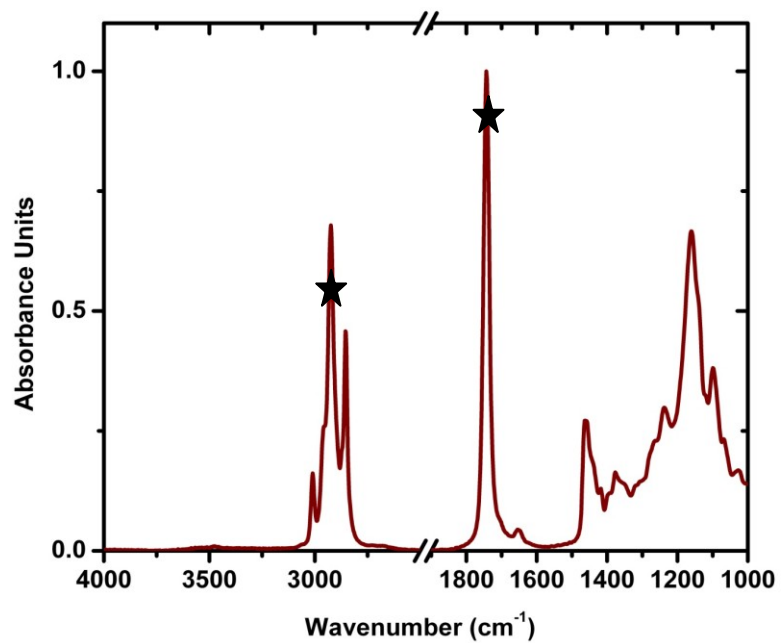
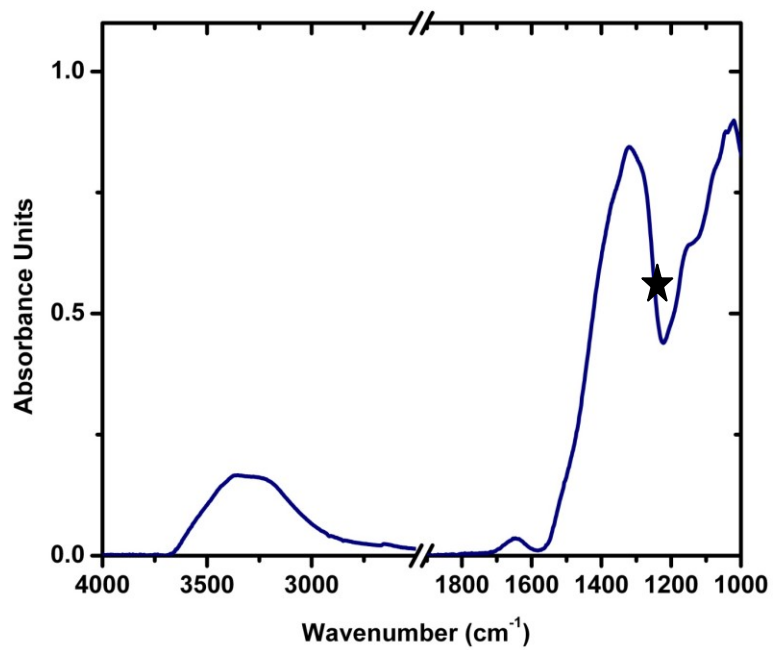


Figure 4.3 FTIR Standard for Timbor®



In the standard for linseed oil (see Figure 4.2) note the strong absorption in the carbon-hydrogen stretching region at between 2800 and 3000 wavenumbers. Also, a very strong signal close to 1700 wavenumbers is typically indicative of a carbonyl organic function group (C=O). These are the indicators used to identify linseed oil within the wood Samples. In the standard for Timbor® (see Figure 4.3), it is important to note the very strong absorbance at 1325 wavenumbers. If Timbor® is present in the wood we should see a strong absorption signal in this region in the spectra of the wood. Once the standards were measured, the wood samples were run through the spectrometer. After each sample the machine was cleaned thoroughly and reset to standard to ensure accurate measurements were being recorded.

The spectrum shown in Figure 4.4 depicts the fingerprint spectra for all of the wood samples compared to the standard for Timbor®. There are clearly many differences in the fingerprint region and the strong broad absorption shown by Timbor® does not appear in any of the wood spectra. This would indicate that infrared spectroscopy could not detect the presence of Timbor® in any of the wood segments.

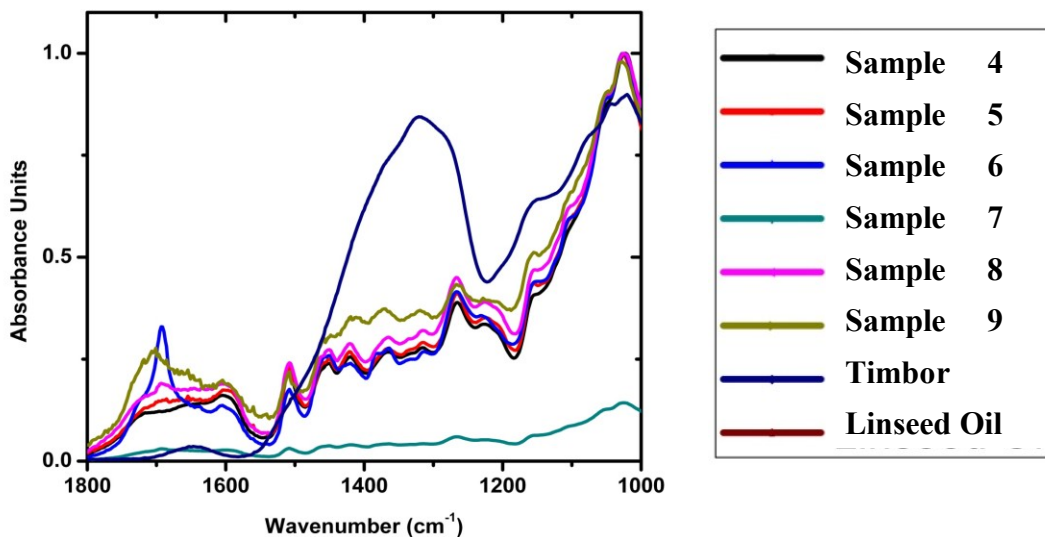


Figure 4.4 FTIR Comparison of Wood Samples, and Timbor®

Next, the wood samples were compared with the standard for linseed oil (see Figure 4.5). If there were significant concentrations of linseed oil in the wood we would expect a very sharp absorption in the spectra at about 1750 wavenumbers. Although we don't see this sharp absorption the wood samples do absorb some light in this region. There are also other areas in the spectra of the wood where we can see what could be contributions from linseed oil. Based on this evidence and the presence of the sharp absorption feature in the carbon-hydrogen region it does appear as though the wood contains some linseed oil.

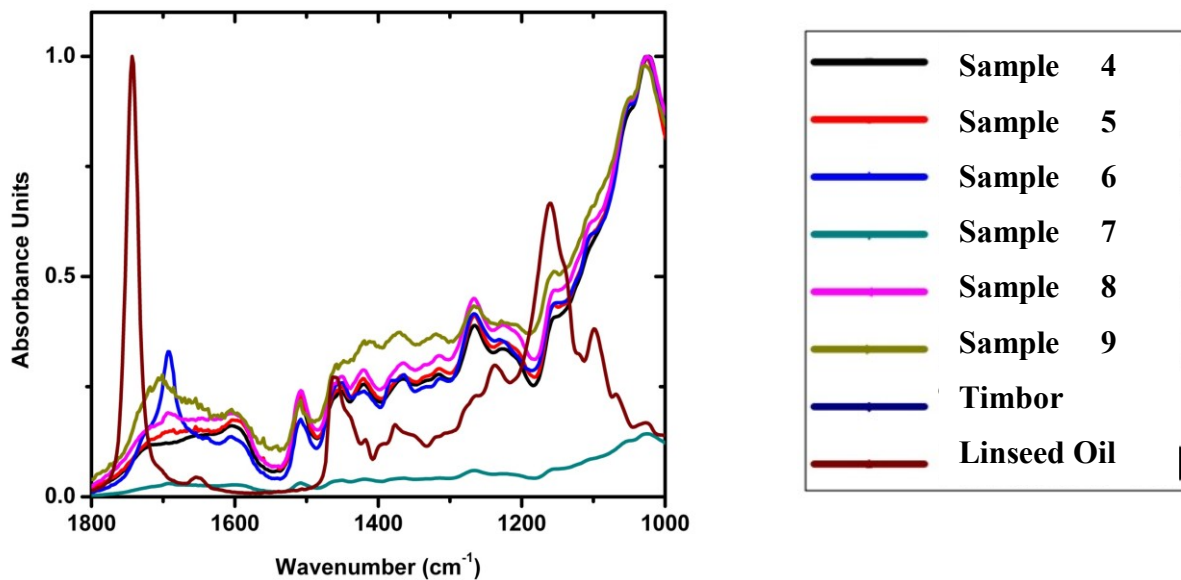


Figure 4.5 FTIR Comparison of Wood Samples, and Linseed Oil

Details concerning each wood sample are as follows:

- Sample 4, closest to the exterior of the hull, appears to have the lowest concentration of linseed oil. This may be due to the fact that the exterior surface was either treated well with Timbor® to remove linseed oil, or environmental exposure has removed the oil.

- Sample 5, which is the next closest segment to the exterior surface, appears to contain more linseed oil than Sample 4, indicating that the oil appears to have penetrated beyond the surface of the wood and it has not been completely removed from this area.
- Sample 6 which is from the center of the timber also contains a relatively high concentration of linseed oil, again indicating that the oil has penetrated deep within the wood.
- Sample 7, shows the weakest signal for linseed oil, and the sharp features associated with linseed oil or similar chemicals are not as evident. This sample is towards the interior of the hull.
- Sample 8, which is a sample taken from the interior surface of the wood, shows a higher concentration of linseed oil than Sample 4. This may be due to the fact that the surface has not been exposed to the same environmental factors as the exterior surface or that Timbor® treatment in this area was not as effective.

It should be noted that due to the fragmentary nature of the core sample, it is possible that Sample 7 fragments were located closer to the interior of the ship than Sample 8, but became disoriented during sampling. In conclusion, these results indicated that the linseed oil treatment penetrated the core of the wood and remained in place despite efforts to remove the treatment with Timbor®. Lower or undetectable amounts of linseed oil towards the surface of the timber indicate that some of the linseed oil was removed, but it cannot be determined if its absence is due to Timbor® treatments, or exposure to natural elements.

4.8 Scanning Electron Microscope Results

To better understand the results of the SEM, it is important to have background information on the nature of wood cell structure. First, it is important to clarify that there are

three planes that a wood sample can be cut and viewed. The first is the transverse plane, which is the result of a cut along the x-axis of the tree. The second is the radial plane, which is seen by a cut along the y-axis of the tree. Finally, the third is a tangential plane, which results in a cut along the z-axis of the tree. Figure 4.6, shown below, is a representation of how these three planes can be viewed. For the purposes of this research, the transverse and radial planes were most commonly used.

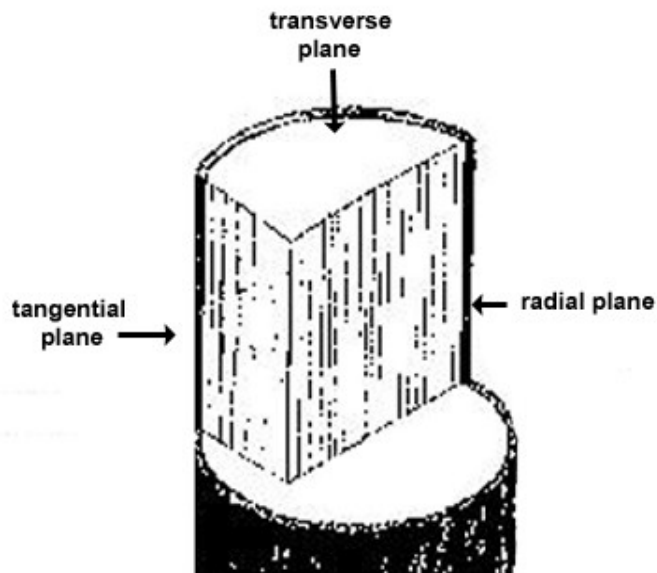


Figure 4.6 Depiction of Wood Planes⁴⁷

⁴⁷ Texas A&M University, <http://nautarch.tamu.edu/CRL/conservationmanual/File6.htm>, (accessed May 28, 2013).

Within wood identification, there are two primary classifications of wood: hardwood and softwood. Hardwoods are comprised of trees such as oak, walnut, maple, and birch; while softwoods are comprised of trees such as pine, balsam, and spruce. The *Neuse* was built from yellow pine, a softwood tree grown locally in North Carolina. Softwood is also often known as coniferous wood and has longitudinal tracheids that function as passageways for liquids and also mechanical support. Nutrients and other substances are exchanged between adjacent cells via openings in the cell walls known as pits.⁴⁸ Both tracheids and pits are visible on the images captured the SEM. The structure of tracheids and pits are clearly demonstrated in a hardwood in Figure 4.7 shown to the right.

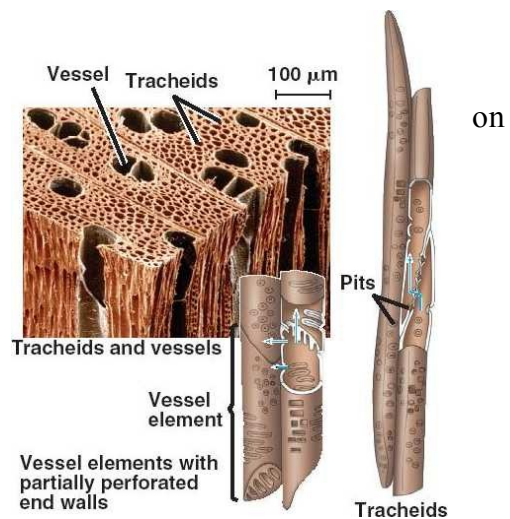


Figure 4.7 Depiction of Tracheids and Vessels⁴⁹

Figure 4.8 shown below, demonstrates the basic structure of a wood cell, which consist of a cell wall surrounding a cell cavity, or lumen. The outermost layer of a wood cell, known as the primary wall, is the first solid covering of a new cell. The second wall, adjacent to the primary wall, is divided into three layers, the outermost layer being S1 and the innermost S3. Notice the middle lamella is located between neighboring cells and combines them into tissue.⁵⁰

⁴⁸ A. Unger, A.P Schniewind, W. Unger, *Conservation of Wood Artifacts: A Handbook* [Springer-Verlag Berlin Heidelberg New York] 12

⁴⁹ http://bio1903.nicerweb.com/Locked/media/ch35/plantcells_xylem.html, [accessed May 28, 2013].

⁵⁰ A. Unger, A.P Schniewind, W. Unger, *Conservation of Wood Artifacts: A Handbook* [Springer-Verlag Berlin Heidelberg New York] 14

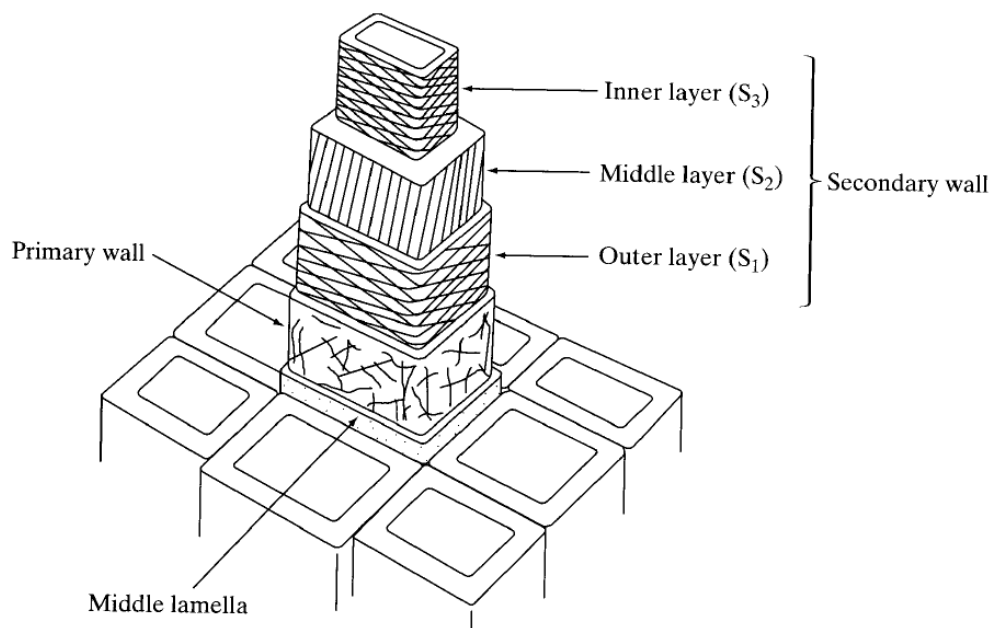


Figure 4.8 Depiction of Wood Cell Structure⁵¹

Wood cells are responsible for transporting nutrients throughout the tree and also for maintaining structure and strength. By examining the wood cells of the samples collected from the *Neuse*, it was possible to determine degradation levels of the remaining cell structure. SEM is useful to conservators because it not only provides images of the overall strength of the wood, but also can reveal if the wood has been exposed to bacterial or fungal damage.

In addition to FTIR spectroscopy, the SEM revealed the general condition of the wood samples. Figure 4.9 shown below, demonstrates a cross section of the tracheid cell walls with pits visible in Sample 4. The sample has limited bacterial and fungal decay of the primary and middle lamella cell wall. These results are contrary to what was once thought by state conservators that attributed bacteria and fungi to the decay of the *Neuse*.

⁵¹ Missouri University of Science and Technology, http://classes.mst.edu/ide120/lessons/wood/cell_structure/index.html, (accessed May 28, 2013).

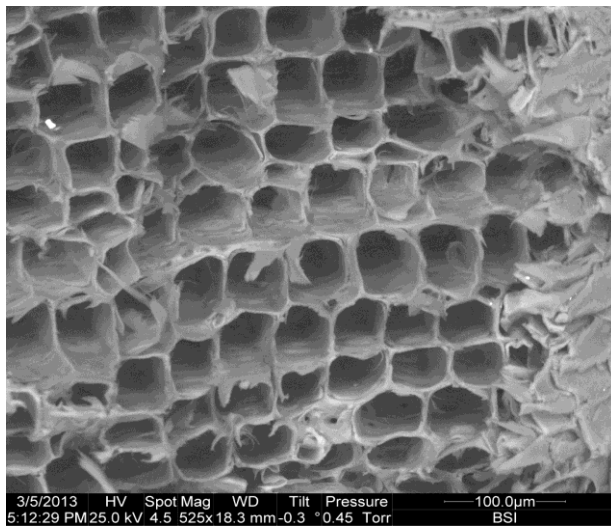


Figure 4.9 SEM Sample 4 Wood Cell Structure

Sample 5 in Figure 4.10 shown below shows the fragile and brittle nature of the wood cells. The primary wall and middle lamella remain structurally intact and the pits are visible.

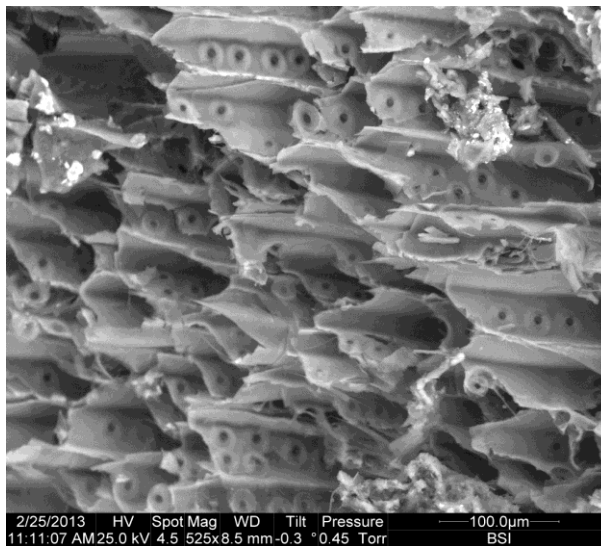


Figure 4.10 SEM Sample 5 Wood Cell Structure

Sample 6 depicts two planes of wood, the transverse and radial. The tracheids are visible in the transverse cross-section, and are ovular due to sampling. Several inclusions are also present and appear to be granular features on the surface and the lumen areas of some of the tracheids are filled with an unknown organic substance, most likely linseed oil. This is consistent with the

FTIR results that indicated the possibility of linseed oil being present in the sample. The labels shown in Figure 4.11 shown below indicate areas that were analyzed using XRD, or elemental analysis.

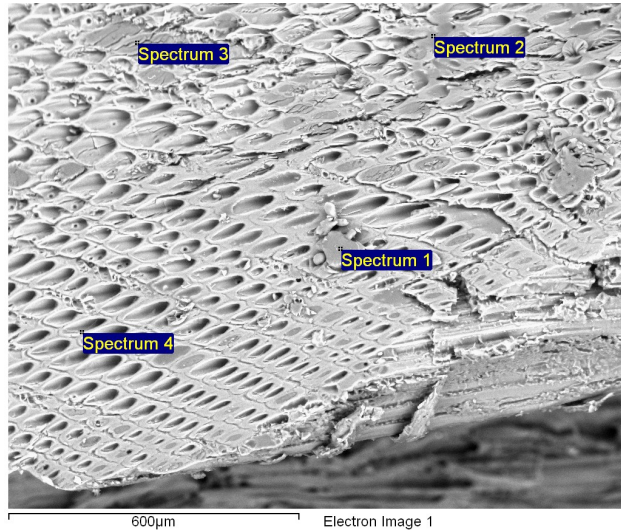


Figure 4.11 SEM Sample 6 Wood Cell Structure

Sample 7, as demonstrated in Figure 4.12 shown below, is a clear representation of the distinct difference between the primary cell walls of the tracheids and the middle lamella, and shows no indication of bacterial or fungal decay. In the figure below the secondary walls also appear to be intact.

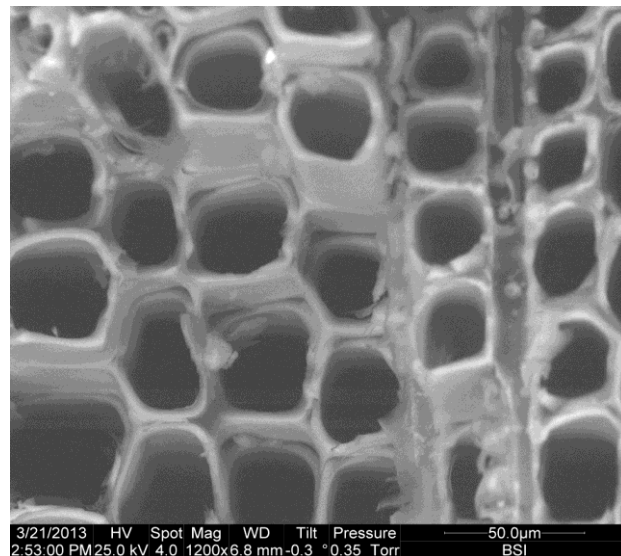


Figure 4.12 SEM Sample 7 Wood Cell Structure

Finally, Sample 8 shown in Figure 4.13 shown below demonstrates the severely degraded nature of the wood cells that travel transversely through the wood. The primary walls and middle lamella are present, but the secondary walls appear to be delaminated, or peeling in thin layers. This could be due to bacterial action or as a reaction to chemicals used in previous treatments. The cells are structurally weak and the tracheid walls are visible on either side indicating that these are less affected structurally.

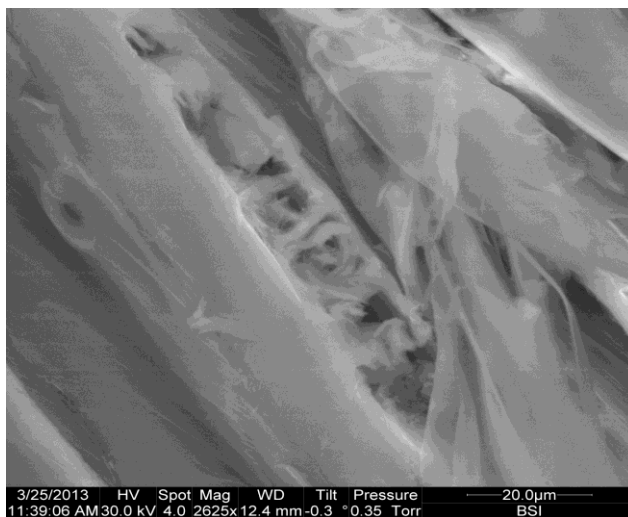


Figure 4.13 SEM Sample 8 Wood Cell Structure

The SEM images revealed that the core wood samples are degraded in certain areas, and the cell walls are thin and the shape is malformed in some cases. The wood is delaminating in thin sheets and the structure of the cells is very fragile. The condition of the wood appears to be due to chemical damage caused by the cocktails of chemicals used to treat the ship. This is contrary to bacterial or fungal damage that is commonly seen on waterlogged wood, also these results dispute conclusions drawn by previous conservators.

Elemental analysis was also an important component of this research. The majority of samples were composed of carbon and oxygen, which is to be expected with organic materials such as wood. It should be noted that energy dispersive microanalysis is not a reliable tool for

measuring organic components. The elemental analysis was helpful in identifying inorganic particulates visible in some SEM images. The most interesting sample that was analyzed is Sample 4ac, which is the third quarter of subsample 4a and is located closer to the interior of the core. The EDX results of this sample indicate inorganic compounds such as sodium, silicon, chlorine, potassium, calcium, and iron. Weight percentages of the elements are listed as follows in Figure 4.14:

Element	Percent Composition (by weight)
C	79.67%
O	63.48%
Fe	10.62%
Na	1.56%
Cl	.40%
K	.29%
Ca	.21%
Si	.15%

Figure 4.14 Chart of Elements and Their Percent Weights Found on Sample 4a

Other samples analyzed also contained magnesium, nickel, and aluminum in low concentrations, which indicate contaminants from the sample preparation.

Elemental analysis on Sample 6 was performed on areas with visible unique features, particularly a bulbous product on the surface of the wood seen in the figure below (Spectrum 1) and in the areas of the tracheids that were filled (Spectrum 3). Spectrum 1 showed higher concentrations of carbon and oxygen than on the wood cells alone (Spectrum 4) indicating that the bulbous features were organic in nature. Spectrum 3 also indicated higher concentrations of

organic material when compared to the wood cells alone, but also included trace amounts of iron. This suggests that iron ions are present in the material filling the tracheids.

Overall, the SEM images revealed that the primary wall and middle lamella of the wood cells remained structurally sound and there is an obvious lack of biological degradation, with the exception of the potential absence of the secondary cell wall in some areas. The samples do appear to have been extensively damaged by chemicals. This is indicated by defibrillation and delamination of the tracheid walls that are also evident on a macroscopic scale.

4.9 Conclusion

In conclusion, the results from this research indicate that the linseed oil has penetrated further into the wood than previous conservators once thought. Also, the Timbor® has not been an effective treatment for penetrating into the wood to protect and leach out unwanted linseed oil. New treatments should be considered for the *Neuse*. In the future, conservators should focus on observing the ship now that it is in a controlled environment. Also, since the wood is dry, there is not much that can be done to chemically treat the ship. Chemical treatments can cause further harm, and future conservators should take great care in choosing their treatments. The hull of the *Neuse* is badly degraded and additional chemicals could potentially harm the wood structure if not chosen carefully. Also, considering the large volume of chemicals already present in the wood, future scientific research could prove to be difficult. Although chemicals do produce a distinct spectrum when exposed to infrared, some of these spectra can overlap making deciphering results difficult. While spectroscopy has its limits future work could be conducted by performing chemical extractions and employing chromatography to obtain a more detailed chemical composition. While further research on the wooden hull of the *Neuse* is encouraged, re-treatment of the related artifacts should begin immediately. The artifacts excavated along

with the hull of the ship were originally conserved during the 1970's and the treatments are no longer effective. The artifacts are now in danger of great deterioration and are in need of immediate attention.

Chapter 5.0: Treatment and Analysis of Artifacts Associated with the CSS *Neuse*

Much can be learned about early conservation from studying the *Neuse*'s recent history. Due to the nature of the ship's excavation, treatment of the ship and its associated artifacts was not done in a traditional manner. This chapter seeks to understand early conservation treatments and methodology that were applied to the *Neuse* artifacts. As discussed in previous chapters, the conservation of the ship and artifacts was largely experimental. The conservation field itself was in its early stages in the 1970's when initial treatments took place. Also, due to lack of resources and time, Bright and his team were forced to work under hurried conditions using treatments that were not meant to be effective for more than ten years. This was especially true in the conservation of the ship's hull, but it is also applicable to the artifacts as well. Three of the most common materials from the ship, iron, copper, and wood, were treated for educational purposes and reported in this chapter. By examining these materials, a greater understanding of the original conservation project can be gained.

5.1 Historical Background

For the purposes of this project four sets of artifacts, that have significant historical meaning, were chosen to be treated. These artifacts include 25 iron canister shot, a copper alloy powder tank lid, a copper alloy chamber pot lid, and two wooden ladder rungs. To gain a better understanding of the significance of these artifacts, it is important to study their history, and how they were used on board ship.

The *Neuse* was a functioning Confederate ironclad during the American Civil War. It was equipped with all means necessary to engage the enemy in battle, and also served as living quarters for its crew. The ship was well supplied with armaments that included two 6.4 foot

Brooke rifles, which were stationed on opposite ends of the casemate and capable of shooting at 90 degrees broadside and 45 degrees at fore and aft. These guns had the capacity to shoot Brooke and Mullane cannon shells, grape shot, and smaller canister. During the excavation 9 complete canister shot stands were recovered, which was a total of 362 individual shot.⁵² Each stand was capable of holding about 25 shot along with iron clinkers (see Figure 5.0).



Figure 5.0 Iron Clinkers

The iron clinkers were bits of scrap iron that were broken into small pieces, and their purpose was to inflict as much damage as possible. Also, the iron clinkers were used as space fillers when the iron shot rations were low. The canister was typically made of iron, and upon being fired from the gun would disintegrate. Canister shot closely resembled a large shotgun blast that was most effective at close range. Due to an iron shortage during the Civil War, it was common for weapons to be made from recycled scrap metal. The historical record indicates that the canister shot were most likely manufactured in the Charlotte Naval Yard. Also, it is very

⁵² Leslie S Bright, William H Rowland, and James C. Bardon, *C.S.S. Neuse A Question of Iron and Time* [Raleigh, NC: Division of Archives and History North Carolina Department of Cultural Resources, 1981], 77.

likely that the canister shot are not made from 100% iron, and contain traces of other metals such as silver, copper, and aluminum.⁵³

Along with numerous canister shot stands, one grapeshot stand, and 43 Brooke and Mullane shells, the *Neuse* was stocked with powder tanks full of gunpowder rations. These powder tanks were constructed from copper alloy and were responsible for the most significant event in the ship's history. During the battle of Wyse Fork, Captain Joseph Price ordered his men to sink the *Neuse*, and within minutes the ship was engulfed in flames. Price's intention was to completely destroy the ship to prevent Union forces from capturing the *Neuse*. The sequence of events that followed changed the future of the ship forever. Instead of fire consuming the ship, the powder tanks located in the port bow ignited and caused a massive explosion ripping a 20 foot hole in the side of the ship. As a result of the explosion water rushed in and choked the flames and caused the ship to sink to the bottom of the river. Thanks to the powder tank explosion, historians can study the *Neuse* to gain a greater understanding of the Confederate Navy and its role in North Carolina during the Civil War.

According to records kept in the Rowland Papers, the majority of artifacts recovered from the *Neuse* are considered to be inorganic materials because they are primarily metal objects. There are a few objects that were recovered that are organic, or constructed of natural materials. An excellent example of an organic artifact recovered from the interior of the ship is the partial wooden ladder. The historical record indicates that this ladder was most likely used as passage into the hull of the ship from the casemate. The existence of this artifact gives insight into the sinking of the ship. For example, it is clear evidence that the fire meant to destroy the ship was short lived and the explosion and sinking occurred quickly before the interior of the ship could be destroyed by flames.

⁵³ CSS *Neuse* State Historic Site Staff, CSS *Neuse* State Historic Site, Kinston NC.

Finally, the copper alloy chamber pot lid provides insight into the daily life on board the *Neuse*. Although the ship never saw significant military battle, it still served as home and headquarters for soldiers stationed to the *Neuse*. Personal artifacts such as the chamber pot lid allow public historians to communicate and relate the effects of the Civil War on an individual and personal level.

5.2 Previous Conservation and Chemical Analysis

This research aims to examine previous conservation treatments applied to the artifacts associated with the *Neuse*, if these treatments have been effective, and if not how to correct treatment failures. Conservation of artifacts is directly correlated with how they can be presented to the public. If an artifact is not well preserved and cared for, it cannot be properly interpreted in museum exhibits. In the case of the *Neuse*, museum professionals have been granted a new and exciting opportunity to present the history of the ship to the public with the building of the *Neuse* Civil War Interpretive Center. The new museum will provide essential storage space for artifacts, and the museum's new relationship with conservators at East Carolina University will ensure that the *Neuse*'s artifacts will be well cared for and monitored properly.

In order to determine the effectiveness of past treatments, it is important to examine initial treatment methods employed by Bright and his team. Due to the nature of conservation in the 1970's, previous conservators did not keep proper records of their treatments, making determining future treatments difficult. Leslie Bright was one of the original conservators treating artifacts from the *Neuse*. His book *Iron and Time* provides vague details on previous treatment of the artifacts associated with the *Neuse*. He writes

In 1965, the science of preserving artifacts from underwater environments was in its infancy. Lack of funds and the urgency of the *Neuse* backers to display the artifacts, in many instances dictated the method of preservation. *Neuse* artifacts were generally divided into three categories for treatment: metallic, organic, and

compound. In most cases sturdy metallic artifacts were sandblasted to remove rust and scale. They were then dried in an oven at 212 degrees for 48 hours and coated with polyurethane, or epoxy resin. After the initial coating dried, iron filings were mixed in a second coating and applied to eliminate gloss. Fragile metallic artifacts were cleaned by electrolytic reduction....Organic artifacts were cleaned by manually washing and brushing or with diluted phosphoric acid when foreign matter persisted. They were then soaked seven to fourteen days in polyethylene-glycol of various molecular weights, ranging from 400 to 4,000 percent with water in order that they remain in solution. The organic materials were then air-dried two to four weeks before an insecticide was applied. After drying two to four additional weeks, a clear diluted wood sealer was applied. In some instances a flat vinyl coating was applied to prevent glossy surfaces.⁵⁴

While this report is helpful in knowing general treatments, more information was needed than provided in order to make a decision regarding effective re-treatment methods. The iron canister shot were of particular interest because they were in poor condition and demanded the most attention. Chemical analysis has proven to be extremely beneficial in determining how the canister shot should be treated. The black protective coating, thought to be polyurethane, was unique in that common solvents were not effective for its removal. In order to remove the protective black coating for testing, solvents such as toluene, white spirits, denatured alcohol, and acetone were applied with a Q-tip and did little to remove the coating.

Quantitative analysis is a process of measuring how much of a constituent is present in a substance. This type of analytical chemistry played an important role in the conservation process. There were several possibilities for polyurethane protective coatings that Bright and his colleagues might have employed. It was important to know the exact chemical makeup of the coating so that an effective solvent could be chosen for the removal of the coating.

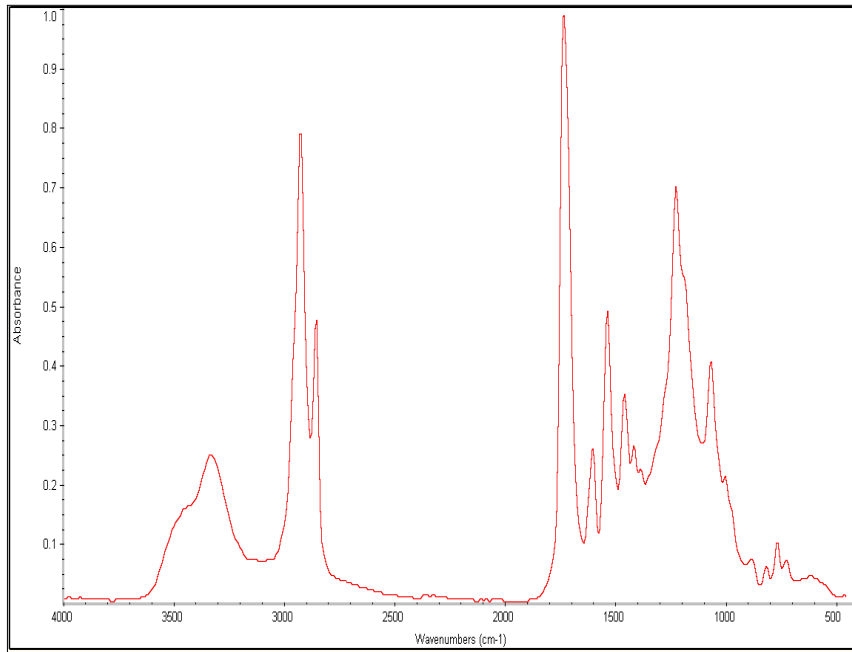
Samples of the coating were removed from shot D, and collected for testing. In this case, Fourier Transform Infrared Spectroscopy (FTIR) was employed to determine exact chemical

⁵⁴ Leslie S Bright, William H Rowland, and James C. Bardon, *C.S.S. Neuse A Question of Iron and Time* [Raleigh, NC: Division of Archives and History North Carolina Department of Cultural Resources, 1981], 139.

composition of the protective black coating. In general, spectroscopy is a method that uses light to measure chemical concentrations.⁵⁵ The results from the test confirm that the coating is a linseed oil rich polyurethane with a 90% confidence (see Figure 5.1). Notice the similar peaks at 3000, 1700, and 1200 wavenumbers that confirm that the coating on shot D is a urethane alkyd linseed oil rich substance.

⁵⁵ Harris, Daniele C. (2007) *Quantitative Chemical Analysis*, Vol 7, W.H. [Freeman and Company: New York, 2007].

URETHANE ALKYD, LINSEED OIL-RICH



NEUSE SHOT D

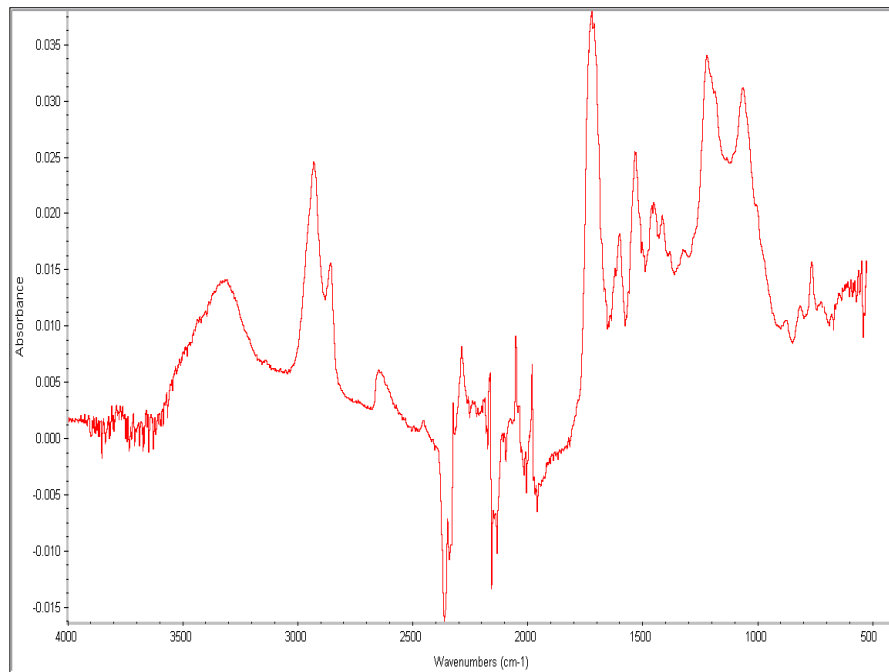


Figure 5.1 FTIR Spectra of Urethane Alkyd, Linseed Oil Rich in Comparison to *Neuse Shot D* Coating

The linseed oil was most likely used as a binder in the polyurethane. The sample was placed in the spectrometer with both sides facing the light beam. This methodology suggests that a mixture of coatings could have been applied to the artifact. Also, the pattern of the coating indicated that it was sprayed on the artifact much like aerosol paint. In the future more precise studies, such as gas chromatography, should be conducted to determine chemical composition. A sample of coating from the copper alloy artifacts was also tested with FTIR. The coating was removed with a scalpel, and came off in a powder form. The results from the spectroscopy indicated that the protective coating on the copper alloy artifacts was an alkyd resin with 83% confidence. Alkyd resins resemble and are sometimes made from drying oils, in this case, linseed oil. Alkyds were developed circa 1930 and were commonly used as a medium in paints. Several varnishes have been identified and found to be less soluble than the dried oil of normal paint medium and is nearly impossible to remove without causing damage to the paint. Such paints should not be used in conservation since they are irreversible.⁵⁶ Alas, this type of coating was used on the copper alloy artifacts, and has proven to be difficult to work with.

In addition to spectroscopy, x-ray elemental analysis was employed to determine the general elemental makeup of the canister shot. The purpose of the x-ray analysis was to help determine the best future treatment method. A magnet test suggested that the canister shot were primarily constructed from iron. The historical record indicates, however, that during the Civil War iron was in short supply and metals were often mixed to quickly manufacture weapons.

Shot R was chosen to be tested in the Scanning Electron Microscope (SEM) utilizing the Elemental Dispersive X-Ray. It was chosen because it is a partial shot and was the correct size to safely fit inside the SEM. The shot was thoroughly cleaned with acetone to remove as much

⁵⁶ Mills S, John, White Raymond, *Organic Chemistry of Museum Objects* [Butterworth Heinemann Publishing, 1999], 36.

of the protective coating as possible. The x-ray analysis revealed that the shot were generally made primarily of iron with small amounts of other metals incorporated.

The Chart shown in Figure 5.2 shown below, demonstrates the percent weights of the elements found on the surface of the shot.

Element	Percent Composition (by weight)
Fe	28.35%
C	12.97%
O	10.40%
Cl	2.76%
Si	2.64%
P	1.38%
Al	0.67%
K	0.16%

Figure 5.2 SEM a Chart Listing Percent Weights of Elements found on the Surface of Shot R

Elemental analysis confirmed the results of the magnet test, and revealed that the shot was primarily made of iron. With this knowledge a treatment proposal for the iron canister shot along with the copper alloy artifacts and wooden artifact was drafted.

Several factors have contributed to the deterioration of the *Neuse* artifacts. Ineffective conservation treatments only contribute in part to the artifacts destruction. Past storage methods are also contributory to the poor condition of the collection. In the late 1990's Hurricanes Dennis and Floyd were responsible for destroying the storage facility and *Neuse* museum and welcome center. The artifacts sat in floodwaters for two weeks before being placed in storage in

Raleigh where they received no known treatment. When the artifacts were returned to Kinston, the historic site was not prepared with proper artifact storage facilities. In an effort to safely store the artifacts, staff at the historic site kept the artifacts in an outdoor locked storage unit. While this facility provided protection from vandals, it did not protect against fluctuations in humidity and temperature. Also, insects, dirt, moisture, and other harmful substances are not protected against in the outdoor storage unit. Under these conditions, the artifacts have slowly deteriorated over time, and now require attention.

5.3 Treatment Proposal

Treatment proposals are an important step in the conservation process. This step takes place before conservation begins, and permits the conservator to research the artifact in question prior to treatment. Research is an essential step in the conservation process because it allows the conservator to gain a greater understanding of the significance of the artifact and determine the best method for conservation. Treatment proposals are generally comprised of two main components, the condition report and proposed treatment methods. The condition report portion of the proposal provides information regarding the artifacts current condition. Condition reports are necessary to determine best possible treatment methods. Often, conservation labs provide information sheets that are to be filled out by the conservator that list data such as weight, dimension, object description, and proposed treatment methods. It is important for conservators to list proposed treatment methods to their clients. This information provides a general knowledge of the conservation process, and how the object will be treated while in the conservators care. While in most cases the proposed treatments will be followed, on occasion treatment may be altered due to changes in the artifacts condition.

The conservation field has undergone great changes since its early stages in the 1970's. Still, there are basic steps that are generally followed when treating artifacts. There are differences when treating terrestrial and waterlogged artifacts and they mostly revolve around desalinating and drying waterlogged artifacts. Although the *Neuse* was waterlogged for nearly 100 years, today the artifacts are completely dry and must be treated as terrestrial artifacts. The primary goal of conservators is to treat artifacts with measures that are not invasive and are reversible. Typically conservators will attempt to clean an artifact without the use of chemicals, and if chemicals are necessary they will be chosen by their strength. For example, if an artifact requires chemical treatment, the conservator will typically begin with a solvent such as denatured alcohol or acetone rather than a stronger more invasive chemical such as Hydrochloric acid. Once the artifact has been cleaned, the next step of preventing further corrosion will vary depending on the material composition of the artifact. In the case of the *Neuse* most of the artifacts treated were iron or copper. Metals are known for corroding and measures must be taken in order to ensure that the object is not further destroyed by corrosion, and therefore, a corrosion inhibitor is applied. Finally, in the case of the majority of *Neuse* artifacts, to ensure that the artifact is fully protected a wax or other substance can be used in order to form a final protective barrier between the artifact and the surrounding elements. Treatment proposals are essential to properly treating artifacts because they provide important background information on the artifact while also allowing the conservator to research and carefully consider their treatment plan. The following is the treatment proposal for artifacts treated in this research.

Iron Canister Shot:

The canister was thin and fragile and there was a significant amount of rusting on the inside bottom as well as minor rusting on the inside and outside walls. Each individual shot was

especially rusty in areas where they rested against one another inside the canister. This effect was probably due to moisture pockets created by the touching metal causing a galvanic corrosion process. All of the shot appear to have been treated with the possible linseed-oil-rich polyurethane, or for the purposes of this report the “black protective coating”. Each shot was about 5cm in diameter give or take a few tenths of a centimeter. Reference Figures 5.3 and 5.4 below for a visual reference regarding the original condition of the shot.



Figure 5.4 Shot A

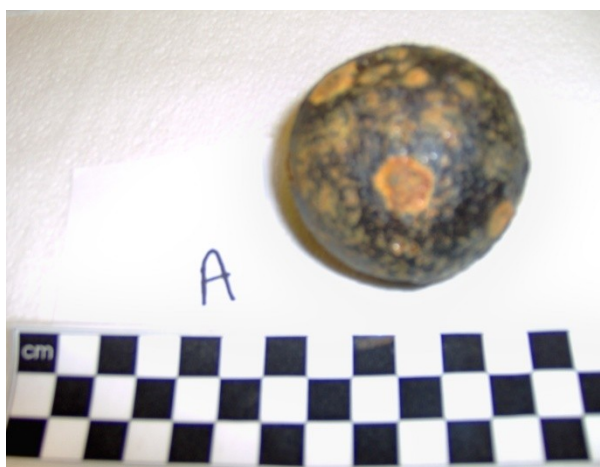


Figure 5.3 Canister and Shot

The following actions are proposed for conserving the canister shot:

1. Mechanically clean with a stiff bristle brush. This will remove all loose dirt, rust, and protective coating. Tools that will be required are dental tools, Kimwipes®, Q-tips, storage containers, paintbrushes, and personal protection equipment.
2. Chemically clean with appropriate solvents, such as acetone, to remove surface rusting. Solvents that are proposed for use and experimentation are acetone, Goo-Gone®, paint stripper, and denatured alcohol.

3. If necessary, soak the canister and shot in solvents in order to loosen and remove the protective coating. Using multiple solvents will give information to future conservators on which solvent is most effective in removing the coating.
4. Wash artifacts with mild dish soap from solvent and allow to air dry.
5. Apply a corrosion converter, such as tannic acid, to convert unstable iron corrosion products back to an electrically stable state and allow to air dry.
6. Apply a protective coating, such as microcrystalline wax.

Also, the use of an electrolysis set up may be required to experiment with selected shot.

Variables on treatment time include the strength of the solvents, reversibility of the coating, and effectiveness of tools.

Copper Alloy Powder Tank Lid:

The powder tank lid (see Figures 5.5 and 5.6) is possibly one of many fragmented pieces of the gunpowder tank responsible for the sinking of the *Neuse*. The lid's measurements are 23cm in length, 16cm in width, and 2cm in height. The condition of the lid gives proof of its involvement in the explosion that was responsible for sinking the ship. The lid is made from copper alloy as evidenced by the lack of magnetic attraction, heavy weight and green patina and corrosion products on the surface. The top of the lid in particular was covered with a stable dark green patina, and there were some areas of orange rust spots that were likely due to an iron object resting against the lid while in storage. The handle to the lock, located on the top of the fragmented lid is broken, but can still be rotated, and there is a small amount of unstable green patina on the broken handle. The surface and underside of the lid is smooth with the exception of scratches along the ridge in the middle. The threads are missing from half of the lid, and the top right corner is bent. There is an old acquisition number on the underside of the lid that reads

75-43-28. Along the top of the underside is a milky colored patina along with two cracks that run vertically on the left side of the lid. There is also a small crack along the bottom middle of the lid that runs horizontally. Finally, there is evidence of lead soldering around the lock and there is a small amount of rusting.



Figure 5.5 Front of Powder Tank Lid



Figure 5.6 Back of Powder Tank Lid

Before treatment of the powder tank lid, the CSS *Neuse* State Historic Site staff was contacted to determine desired aesthetics. Since the lid is one of many fragmented pieces from a single powder tank, it was important to have a record of the overall desired appearance. Also, this artifact will most likely be put on display in the new museum, and it is imperative that all of the fragments of the powder tank be uniform. Morris Bass, the Site Operation Manager, indicated that he wished to leave the natural dark green patina, giving the artifact a more historically accurate appearance. The following actions are proposed to conserve the powder tank lid.

1. Mechanically clean with toothbrushes and warm soapy water
2. Remove the rust stains and unstable green patina with bamboo sticks and acetone
3. Apply an Acryloid and/or microcrystalline wax coating

These goals will be accomplished with the use of toothbrushes, neutral soap, Paraloid B-48, acetone, bamboo sticks, microcrystalline wax, and Kimwipes®. Conservation of the powder tank does not require removal of the protective coating or the natural dark green patina.

Copper Alloy Chamber Pot Lid:

The chamber pot lid is in good condition, and it is 22.5cm in diameter. At first glance it appears to be made from copper alloy due to the green patina on the surface. There is another metallic coating that cannot be determined by physical characteristics, and a metal test must be conducted to authenticate the metal type. The lid is concave in the middle with a small metal handle attached by soldering. There was a string attached to the handle where an acquisition tag was previously attached. There was also what appeared to be part of a sticker attached to the outside edge. There is some surface rust on the artifact that is most likely due to an iron object resting against the lid. The bottom is convex, and there is a raised place in the middle where the handle attached on the underside. The green patina is uniform, and there appears to have been plating that was possibly mechanically scraped off by previous conservators. There does not appear to be a protective coating on the chamber pot lid. See Figures 5.7 and 5.8 below for a visual reference to the chamber pot lid.



Figure 5.7 Front Side of the Chamber

Pot Lid



Figure 5.8 Back Side of the Chamber

Pot Lid

The following steps are proposed to conserve the chamber pot lid.

1. Mechanically clean with a toothbrush and warm soapy water
2. Remove the rust stains with a bamboo sticks and acetone
3. Apply an Acryloid and/or microcrystalline wax

These goals will be accomplished with the use of toothbrushes, dawn dish soap, Paraloid B-48, acetone, bamboo sticks, and Kimwipes®.

Wooden Ladder Rungs:

Two ladder rungs comprised this artifact. Rung A has 2 iron nails (see Figures 5.9 and 5.10). The nails were loose and were easily removed from the wood. They will be removed from the wood and be treated separately. The wood is a light brown color with moderate checking, and there are nail holes in each section. There are also lighter gray sections that may be due to original white washing. Ladder Rung B is in the same condition, but does not have nails and only has three nail holes.



Figure 5.9 Front of Ladder Rung A



Figure 5.10 Back of Ladder Rung A

In order to successfully treat the wooden ladder rungs, the following steps are proposed:

1. Remove the iron nails.
2. Chemically clean the iron nails with a solvent such as acetone using cotton swabs

3. Coat the nails with a corrosion converter such as tannic acid to treat the rust
4. Provide a protective sealant on the iron nails with acrylic resins and/or microcrystalline wax
5. Mechanically clean the wooden ladder rungs with a light suction vacuum and micro attachments
6. Mechanically remove concretions and debris with a dental tool
7. Return the nails to their respective holes in ladder rung A

The iron nails should be separated from the wood so they can be properly treated. Tools necessary for treatment include dental tools, a vacuum, small delicate vacuum attachment, Q-tips, acetone, tannic acid, acrylic resins, and Renaissance wax.

5.4 Methodology

Treatment methodology was a particularly important aspect of this project and research. The goal of this conservation project was to determine the effectiveness of past treatments, and re-treat the artifacts where prior coatings had failed with a more modern and reversible, proven treatment. Also, this project was conducted as an experiment to help future conservators that are faced with re-treatment concerns. The iron canister shot required the most time and attention, and were consequently the focus of experimentation. The copper alloy and wooden objects did not require experimentation, and their treatments can be considered traditional.

Iron Canister Shot:

For this experiment and report a variety of methods and solvents were used to treat the iron artifacts. The purpose of this is to determine the most effective and efficient treatment. First, chemical cleaning methods were used. “Solvents are ubiquitous. Not a day goes by when we don't rely on one solvent or another to accomplish some essential task. And yet, who among

us hasn't tried in vain to remove one substance from another, guided by rules of thumb such as, "like dissolves like" or vague concepts of solvent "strength."⁵⁷ Although solvents can be sometimes difficult to work with, they are necessary in conservation. They are important because they dissolve substances and allow for easy removal of paints, coatings, lacquers, waxes and much more. In this experiment, three solvents were used: Citra-Solv®, NEXT® paint stripper, and acetone. Citra-Solv®, a common household cleaner, contains Limonene (the clear liquid from the peel of the orange, food grade), C10-16 Parth-1 (plant derived surfactant), and Citrus *Aurantium Dulcis* (Orange) Peel Oil.⁵⁸ Limonene was known to remove stubborn waxes. NEXT® paint stripper is an eco-friendly paint stripper that does not contain large quantities of harsh chemicals. Paint stripper is well known for removing polyurethane and epoxy resins. Finally, acetone has been used for many uses and has been proven to effective for removing many substances.

The next method of removing the coating is electrolysis, an electrochemical process. "Electrolytic cleaning involves a current flow almost the reverse of that occurring during electrochemical corrosion. Here the voltage is supplied by an external source such as a battery or transformer."⁵⁹ In electrolysis the artifact is connected to the negative terminal and a piece of sacrificial metal is attached to the positive terminal. Both are submerged in an electrolyte such as sodium carbonate and tap water. When the voltage is turned on an electrochemical process occurs that attracts electrons from the sacrificial metal and places them on the artifact. This

⁵⁷ Burke, John, *Solvents Considered at AIC Annual Meeting in Dallas*, AIC News, <http://www.conservation-us.org/index.cfm?fuseaction=page.viewPage&PageID=1047&E:\ColdFusion9\verity\Data\dummy.txt> (accessed November 19, 2012).

⁵⁸ Citra-Solv®, *Citra-Solv® the Natural Choice for over 25 Years: Ingredients*, <http://citrastolv.com/cconcentrate.html> (accessed November, 20, 2012).

⁵⁹ Cronyn, J.M, *The Elements of Archaeological Conservation*, [Routledge: London and New York, 1990].

creates hydrogen gas which forces layers of corrosion product, or in this experiment the protective coating, from the artifact.

Finally, the third method employed is mechanical cleaning through air abrasion. This has been proven effective for removing stubborn coatings and corrosion materials. In this method, mediums such as glass beads, sand, or walnut shells are propelled through an air compressor on to the artifact removing undesired coatings while also polishing metal. In this experiment fine glass beads were the chosen medium.

Copper Alloy and Wooden Artifacts:

The copper alloy and wooden artifacts were treated in a traditional manner. The copper alloy pieces were in good condition with very little unstable patina. The staff at the *Neuse State* Historic Site preferred to leave the natural stable patina on the artifacts because the color is the most historically accurate. In the case of the powder tank lid, removing the clear protective coating would consequently remove the natural green patina. For this reason the decision was made to leave the original clear protective coating. Some spot treating was necessary in areas where an unstable green patina (copper II chloride) and rust were present. To remove the unstable green patina, a bamboo stick and denatured alcohol were employed to mechanically remove the harmful patina and rust. The chamber pot lid did not have a protective coating, and only required basic treatment. Finally, since the wooden ladder rungs were not waterlogged, treatments were greatly limited. Treatments such as polyethylene glycol are reserved for waterlogged wood. The ladder rungs have been dry for several decades and such treatments would not be effective. Instead, the wooden artifact was treated with a mechanical cleaning with a light suction vacuum. The nails that were part of ladder rung A were removed for treatment and replaced at the end of treatment.

The methodology used in this research was essential to successfully treating the *Neuse* artifacts. The experimental nature of the project allows for future conservators to study a variety of methods for treating artifacts, and will hopefully provide helpful information on modern conservation methods. The actual treatment of the artifacts provides insights into a selection of solvents and their effectiveness on polyurethane coatings.

5.5 Artifact Treatment

This project required a degree of experimentation due to the lack of records kept concerning past conservation methods. The historical account of treatment methods indicated the use of polyurethane and epoxy resins to treat metallic materials. Typically, during a retreatment, conservators can research chemicals and coatings employed and reference a particular chemical's Material Safety Data Sheet (MSDS) to determine the best method of removal. Original conservators were not specific with the particular chemicals and brands of coatings used, so important information, such as best methods of removal, could not be obtained from MSDS. This was of particular concern when re-treating the iron canister shot.

Iron Canister Shot:

In order to determine the best method of removing the protective black coating, a variety of solvents, and other removal methods were employed. During the fall semester of 2012 (September—December) randomly selected canister shot underwent several experiments to determine the best method for cleaning the canister shot. The fall semester was utilized to perform the experimentation. Treatments were completed during the spring of 2012. The following is a record of the specific experimental treatments performed in the fall on the randomly selected shot. The numbers listed for each shot are assigned internally for the purposes of differentiating between shot.

- ECCL.2012.002.001A

Shot A was chosen to be placed in a 100% Citrasolv® bath for an extend amount of time. The purpose of this experiment was to determine the most effective solvent for removing the black protective coating. The shot was placed in the bath and stored under the fume hood. The shot was removed from its Citrasolv bath after 2 weeks, and a scalpel was used to attempt to remove the protective coating. A small amount of the coating was removed, but the coating quickly re-hardened and became impossible to remove. A mixture of Joy dish soap and warm water was used to remove the Citrasolv from the shot. Citrasolv is an ineffective solvent for removing the protective black coating. The shot was photographed and the findings were recorded.

- ECCL.2012.002.001B

This shot was chosen to be placed in a 100% acetone bath. Solvent was obtained from the local home improvement store. The shot was placed into the bath and kept in the fume hood for storage. The shot was removed from its bath after 2 weeks. The coating was bubbling and delaminating in thin layers. When removed from the acetone bath, the protective coating dried quickly. In order to keep the coating soft a Q-tip was dipped in 100% acetone and rubbed on the shot. A dental tool was then used to loosen and scrape away the coating. The majority of the coating was removed revealing pitting on a major portion of the shot. Once the shot was completely clean it was placed in dry storage.

- ECCL.2012.002.001C

This shot was chosen to be placed in 100% NEXT® biodegradable paint stripper, obtained at a local home improvement store, this was stored under the fume hood. Once the shot was removed from its paint stripper bath after 2 weeks, the protective coating was very loose and

bubbling. The shot was cleaned by warm water and a copper wire brush. The coating was removed easily and sloughed off in large pieces. The shot was dried with a paper towel and a dental pick was used to remove stubborn coating. Once all of the protective coating had been removed the shot was cleaned using a diluted solution of Trisodium Phosphate (TSP). The shot was again dried with a paper towel and placed in dry storage. Soaking the shot in paint stripper for an extended period of time and scrubbing with a wire brush has proven to be the most efficient and effective treatment for this method.

- ECCL.2012.002.001D

This shot was chosen to be placed in a 100% acetone bath similar to ECCL.2012.002.001B, and kept in the fume hood for storage. The shot was removed from its bath after 5 days. The protective coating had been loosened from the original metal. When a dental pick was used, the coating flaked off in large chunks. These pieces were collected and kept for sampling. The top of the shot was successfully cleaned with Q-tips dipped in acetone to keep the coating soft and a dental pick to scrape away the coating. The large indentation in the top of the shot proved difficult to clean, but the coating was completely removed. Acetone baths have proven to be effective but a very slow method of cleaning the shot. Shot D was completed and placed in storage to await further treatment.

- ECCL.2012.002.001G

Shot G was chosen to undergo electrolysis, and it was determined that a 10% electrolyte solution would be the best for treatment. For the initial setup for electrolysis the volume of the tank was measured and found to be 30,199mL, and this number was divided by 100 to determine the correct amount of Sodium carbonate to be added to the electrolyte solution. A total of 301 grams of sodium carbonate was measured and placed inside the tank, and water was added to the

fill line of the tank approximately $\frac{3}{4}$ full. The solution was given approximately 45 minutes to be allowed to fully dissolve into a homogenous mixture. The initial pH of the electrolyte was nine, which was too low so additional sodium carbonate was added to the mixture until the desired pH of eleven was achieved. Once the electrolysis tank was setup, shot G was placed in the tank. The shot was suspended with metal wire clamps and connected to a DC power source and maintained at 8amps. The shot remained in electrolysis for about 1 week. The protective coating began to fragment off and loosen from the artifact. The shot was removed from electrolysis and placed into dry storage to await further treatment.

- ECCL.2012.002.001H

Shot H was also chosen to be placed in a 100% Citrasolv® bath for an extend amount of time. The shot was placed in the bath and stored under the fume hood. The shot was removed from its Citrasolv bath after 6 days, and a dental pick was used to attempt to remove the coating with no success. A mixture of Joy soap and water was used to remove the Citrasolv from the shot. Citrasolv is an ineffective solvent for removing the protective black coating. The shot was photographed and the findings were recorded.

- ECCL.2012.002.001I

The shot was painted with 100% NEXT® paint stripper, and allowed to sit for at least half an hour before a dental pick was used to scrape away the coating. This method was successful but not as successful as the prolonged soak in the paint stripper. Prolonged soaking allowed the solvent to more effectively loosen and remove the coating from the shot. Painting the stripper on was a more lengthy process over all because it required at least half an hour to begin working. Nonetheless, this method was successful at removing the protective coating.

- ECCL.2012.002.001L

Shot L was also chosen to be treated in an acetone bath, and stored in the fume hood. The shot was removed from its acetone bath after 1 day, and the protective layer began to bubble up and loosen from the shot. However, when the shot dried, the coating hardened again. A spot about the size of a quarter was cleaned using a Q-tip dipped in acetone to keep the coating soft and a dental tool to scrape away the coating. It was placed back in the acetone bath for storage. The shot was allowed to sit in the acetone for a week. When the shot was removed from its bath the coating was soft and easily removed with a dental pick. When the shot dried the coating became hard and a Q-tip dipped in acetone was required to keep the coating soft. A wire brush was used to attempt to remove the coating. The black layer was removed with the brush leaving a yellow/clear coating on the shot. A coating of paint stripper was painted on the shot and left to sit for about half an hour. This was successful as half of the shot was cleaned. The paint stripper does not allow the coating to dry, and therefore it remains soft and easy to scrape away. The shot remained in good condition after being cleaned on half the surface. There was no rust on the newly exposed original metal. Paint stripper was applied to the other half of the shot and allowed to sit for about half an hour. The remainder of the protective coating was removed using this method. There was a very small amount of residue left in the pitting. The shot was placed back in acetone to allow the coating to soak and loosen up. The shot was taken out of the acetone and the remainder of the coating adhering in the pitting was removed with a dental pick.

- ECCL.2012.002.001P

This shot was taken to the East Carolina University Wet Lab to be air abraded. The shot was cleaned using a fine-grained glass bead. The process took about an hour beginning with setup and ending with clean up. This method of treatment was very effective. The coating was

easily removed with the glass beads. The glass beads also polished the original metal. The shot is now shiny and is the color of a polished iron.

Treatment of the canister shot was temporarily suspended for the 2012 academic winter holiday. The artifacts were placed safely in storage to await further treatment in the spring 2013 semester.

Conservation resumed with the beginning of the 2013 spring semester. The shot were removed from storage, and evaluated for changes in their condition, and no major difference in their appearance was reported. The 9 randomly selected shot treated during the fall semester were set aside to await further treatment, and the remaining 16 shot were treated to remove the protective black coating. The fall semester's experimentation resulted in proving that a prolonged acetone bath was the most effective method for removing the protective coating.

To begin treatment the remaining shot were placed in their own individual acetone baths, labeled, and allowed to soak for at least 3 days before mechanical cleaning began. It was discovered that leaving the shot in a shallow acetone bath while mechanically cleaning was the most effective method for keeping the protective coating soft and malleable. The coating was slowly and carefully removed with a dental pick. The coating was easily removed while remaining in the acetone bath. The coating often times came off in large pieces revealing unique characteristics of the shot once hidden by the thick original coating. The remaining 16 shot were cleaned using this method, and the process took about 5 weeks.

Once all of the shot were thoroughly cleaned, they were coated with tannic acid. Tannic acid is a complex organic compound derived from plants. When applied to iron, it reacts with the metal to produce a form of ferric tannate. It produces a dark purple or black color and is

intended to be used on wrought and cast iron on which the black color is appropriate.⁶⁰ A 3% solution was chosen to coat the shot due to its ability to quickly convert to a dark purple and black color. The Canadian Institute for Conservation document for tannic acid treatment was referenced when mixing the tannic solution. Their formula for tannic acid solution included powdered tannic acid, distilled water, ethanol, and phosphoric acid. Ethanol acts as a wetting agent that allows the solution to flow into porous corrosion layers and all fissures on the iron surface, and phosphoric acid lowers the pH of the solution.⁶¹ Both ethanol and phosphoric acid are essential for uniform coverage of the tannic solution onto the iron artifacts. The iron canister shot were coated with the 3% tannic solution with a stiff bristled paintbrush, and each shot received 20 coats of tannic acid solution. The coats were applied in stages to allow the tannic sufficient time to convert fully to the ferric tannate.

Once all of the shot were fully converted and had a uniform black appearance they received one coat of 10% Paraloid B-48N soluble in acetone. This acrylic resin is a protective coating that, when dried, provides a clear, hard, and protective barrier. The 10% Paraloid B-48N was applied with a paintbrush. Finally, the shot were coated with a thin layer of microcrystalline wax to provide an extra layer of protection and a matte finish. The wax was applied with a small paintbrush and was buffed with a Kimwipe®. When the iron canister shot were completed they were placed into dry storage at the East Carolina Conservation Laboratory. Archival tubs were employed to store the objects. Individual artifacts were wrapped in tissue paper to protect them from harm while in storage. The following table in Figure 5.11 demonstrates treatments applied to the iron canister shot.

⁶⁰ Canadian Conservation Institute, *CCI Notes 9/5 Tannic Acid Treatment*, <http://www.cci-icc.gc.ca/publications/notes/9-5-eng.aspx> (accessed May 15, 2013).

⁶¹ *Ibid.*

Artifact	Treatment
Shot A	Citra-Solv® Bath
Shot B	Acetone Bath
Shot C	NEXT® Paint Stripper Bath
Shot D	Acetone Bath
Shot E	Acetone Bath
Shot F	Acetone Bath
Shot G	Electrolysis
Shot H	Citra-Solv® Bath
Shot I	NEXT® Paint Stripper Bath
Shot J	Acetone Bath
Shot K	Acetone Bath
Shot L	Acetone and NEXT® Paint Stripper Bath
Shot M	Acetone Bath
Shot N	Acetone Bath
Shot O	Acetone Bath
Shot P	Air Abrasion

Figure 5.11 Chart Describing Iron Artifact Treatments

Copper Alloy Powder Tank Lid:

The powder tank lid was in moderate condition before treatment. There was a uniform natural stable green patina that covered the surface of the lid along with a substantial amount of dirt. Considering the desired natural aesthetic, the original protective coating was not removed

for fear of also removing the natural patina. The lid was washed with warm soapy water and a toothbrush to remove the dirt and sediment. After washing, several rust spots were discovered, and a bamboo stick and acetone was used to remove the unwanted rust. Also, a bamboo stick and acetone was used to remove the unstable green patina (copper II chloride). Once the lid was clean and void of all unstable patina, it was coated with a 10% Paraloid B-48N soluble in acetone which had been combined with fumed silica. The fumed silica was incorporated into the B-48N to provide a matte finish. The B-48N was applied with a paintbrush and allowed to dry for 48 hours, and once dried was still too shiny. A thin layer of microcrystalline wax was applied with a paintbrush and buffed with a Kimwipe® to produce a matte finish. Once the artifact treatment was complete, the lid was placed into dry storage at the East Carolina University Conservation Laboratory. Archival tubs were employed to store the objects. Individual artifacts were wrapped in tissue paper to protect them from harm while in storage.

Copper Alloy Chamber Pot Lid:

The chamber pot lid was unique because unlike the majority of the *Neuse* artifacts it was not coated in an original protective coating. The lid was cleaned with warm soapy water and a toothbrush to remove dirt and sediment. After washing, several rust spots were discovered, and a bamboo stick and acetone was used to remove the unwanted rust. Also, a thorough cleaning revealed unknown metallic plating. A metal test using metal test strips was performed and it was discovered that the plating was tin. The plating appears to have been removed by mechanical action, either caused by previous conservation methods or sand erosion. It was not uncommon during the Civil War for copper artifacts to be plated with tin, further confirming the historical validity of the chamber pot lid. Once the lid was clean and void of all rust, it was coated with a 10% Paraloid B-48N soluble in acetone combined with fumed silica. The fumed silica was

incorporated into the B-48N to provide a matte finish. The B-48N was applied with a paintbrush and allowed to dry for 48 hours, and once dried was still too shiny. A thin layer of microcrystalline wax was applied with a paintbrush and buffed with a kim wipe to produce a matte finish. Once the artifact treatment was complete, the lid was placed into dry storage at the East Carolina University Conservation Laboratory.

Wooden Ladder Rungs:

Ladder rung A contains two iron nails. In order to successfully treat the nails removal from the wood was required. The nails were removed and cleaned with Q-tips and acetone to remove dirt and excess rust. Once the nails were clean they were treated with the 3% tannic acid used to treat the iron canister shot. A total of 8 coats of tannic acid were applied to the nails with a stiff bristled paintbrush. The tannic reacted well with the nails and turned them a dark black color. The nails were then coated with the Paraloid B-48N and microcrystalline wax to provide a protective barrier. The nails were set aside while the wood portion of the ladder rungs was treated. Both ladder rungs were treated using a light suction vacuum and a small delicate brush attachment. Each rung was carefully vacuumed twice, and sand concretions located on the underside of the rungs were removed with a dental pick. Also, dental picks were used to remove a spider's nest from ladder rung B. Finally, the iron nails were returned to their respective holes in ladder rung A. The wooden ladder rungs were completed and placed into storage at the East Carolina University Conservation Laboratory.

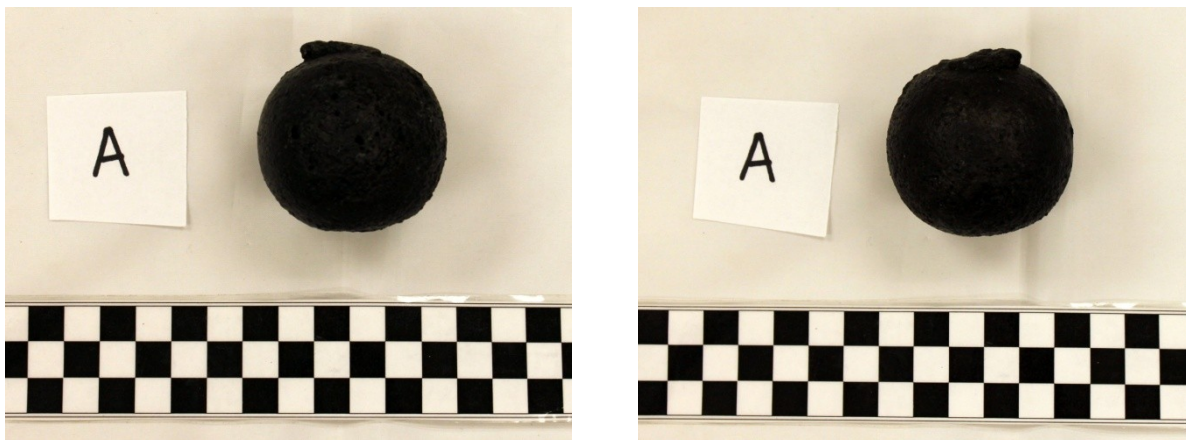
5.6 Analysis and Results

All pictures of before and after treatments are included in Appendix A located at the end of this thesis. The conservation process to treat selected artifacts from the *Neuse* was a learning experience, and it provided great insight into the effectiveness of past treatments. The most

recent treatments yielded successful results and will protect the artifacts for many years into the future. The following is a discussion of the treatment results and analysis of the *Neuse* artifacts. Select pictures of the treated artifacts are included in this report.

Iron Canister Shot:

The black protective coating was analyzed using FTIR and was determined to be a linseed oil rich polyurethane. These results are consistent with documentation of original treatment records. Due to flooding and storage conditions the original treatments were rendered ineffective. Throughout the re-treatment process several methods were used to remove the black protective coating on the artifacts, which was the goal of this research. It was determined that a prolonged acetone bath and mechanical cleaning was the most effective method of cleaning the shot. Once cleaned, the canister shot were treated with tannic acid to prevent further deterioration and sealed with Paraloid B-48 and microcrystalline wax. The shot are now in stable condition and if stored properly will be safe for many years to come. Figures 5.12 and 5.13, shown below, are images depicting the canister shot A after treatment.



Figures 4.12 and 4.13 Shot A after treatment

Copper Alloy Powder Tank Lid:

Treatment for the powder tank lid was not experimental and followed traditional conservation methods. It was not possible to remove the original protective coating without also removing the natural stable patina. Since it was the clients wish to leave the natural stable green patina, it was determined that the original coating would remain on the lid. The majority of the unstable green patina located on the broken handle was removed, ensuring that further deterioration will not occur. The final layer of protection chosen was Paraloid B-48 and microcrystalline wax. The artifact will most likely be placed in an exhibit detailing the sinking of the ship. Thanks to preventative measures taken in this research, the lid will be protected for many years to come. Figures 5.14 and 5.15, shown below, are images of the powder tank lid after treatment.



Figures 5.14 and 5.15 Powder Tank Lid After Treatment

Copper Alloy Chamber Pot Lid:

The chamber pot lid did not require experimentation before re-treatment. The lid was determined to be made from a copper alloy and plated with tin. It was cleaned with mild soap and did not require chemical action. No original coating was found on the lid, so in order to protect the lid from future deterioration it was coated with Paraloid B-48 and microcrystalline

wax. The lid is a testament to the personal lives that were affected by the *Neuse*. If the lid is stored properly, it should remain safe for many years to come. See Figures 5.16 and .17, shown below, for a visual representation of the lid after treatment.



Figures 5.16 and 5.17 Chamber Pot Lid After Treatment

Wooden Ladder Rungs:

The wooden ladder rungs were in good condition when they arrived to the East Carolina Conservation Laboratory. They did require mechanical cleaning, and the nails imbedded in the wood were in need of cleaning and protection. The nails were removed, cleaned and coated with tannic acid to protect against further deterioration. The wood was vacuumed and sediment was removed with soft bristle brushes. The wood is now clean and remains in stable condition. The ladder rungs stand as testament to how short lived the fire was before the explosion that ultimately sank the ship. They should remain in good condition for many years to come. See Figures 5.18 and 5.19 for a visual representation of ladder rung A after treatment.



Figures 5.18 and 5.19 Depict Ladder Rung A After Treatment

4.7 Storage and Recommendations

The East Carolina Conservation Lab will provide storage until the artifacts can be returned to the CSS *Neuse* State Historic Site in Kinston, North Carolina. The artifacts should be stored in a controlled environment where the temperature is kept at around 70 degrees Fahrenheit and the relative humidity at around 30-40%. The shot should no longer be stored in its original canister, but rather in supportive archival products.

When the artifacts are returned to the CSS *Neuse* Civil War Interpretive Center, they should be stored in a controlled environment where temperature and humidity can be maintained at a constant measure. They should not be returned to the outdoor storage unit at Caswell Park because the storage facility does not protect against temperature and humidity changes. As with storage at the East Carolina University Conservation Laboratory, the artifacts should be kept in a facility that is about 70 degrees Fahrenheit and the relative humidity at around 30-40%. Relative humidity is a ratio between temperature and moisture content in the air, and therefore is important to regulate. The artifacts should no longer be stored in cardboard boxes, piled on top of one another, but rather in archival appropriate materials. If the artifacts are to share a storage container, they should be wrapped in protective cushioning such as archival tissue paper.

These artifacts are essential to the history of the *Neuse*, and great care should be taken to protect them from further corrosion. The CSS *Neuse* Civil War Interpretive Center has been granted a wonderful opportunity to utilize the collection to interpret the ships history to the public. In the past, the CSS *Neuse* State Historic Site has not been able to develop fully the use of its collection. With this new opportunity a necessity to care for the artifacts to a greater extent has become priority. Without a well-cared-for, catalogued, and well preserved artifact

collection, the new museum will not be able to communicate the ships history to the public effectively.

Chapter 6.0 Interpreting the CSS *Neuse*

The evolution of museums as professional institutions is directly correlated with the recent history of the *Neuse*. Museums were once simply houses for collections of artifacts not meant for serious academic study. As the history profession progressed in the twentieth century, museums stepped into their role of educating the public. Museums are no longer seen as storehouses for arbitrary collected artifacts, but rather centers for learning. The *Neuse* was recovered in the beginning stages of this development into a profession and has undergone many changes as one of North Carolina's most important artifacts. Throughout the years the site has adapted to the progressive trends of museums and public outreach.

6.1 A Brief History of the CSS *Neuse* State Historic Site

Many challenges were fought and overcome with regards to the ownership of the *Neuse* and associated artifacts. The CSS *Neuse* State Historic Site is one of twenty-seven historic sites located in North Carolina, and had a very interesting history associated with the sites founding. When North Carolina acquired the ship in 1963 it was of upmost importance for the hull to receive a permanent home and begin the conservation process. Typically, the state has a specific set of rules set in place to determine if a site should become a state historic site. Since the *Neuse* was surrounded with extenuating circumstances the requirements, while relevant, were most likely augmented to accommodate the newly excavated *Neuse*. Nonetheless, this process is important in understanding the improvements the site has undergone.

The state's primary goal in determining if a site is worthy of becoming a historical site is its relevance to North Carolina history. The potential site should possess statewide significance in order to become an official historic site. Significant attributes include: connection with

important social movements events or persons, possession of artistic or architectural significance. The site should typify the life of the people of the entire state or a section of the state during a specific period or periods of time, exemplify or shed important light on the life of aboriginal man within the state, and be connected to other significant sites or structures.⁶²

The *Neuse* fulfills nearly all of these requirements and was central to the Civil War in Eastern North Carolina. Secretary of the Navy Stephen Mallory placed much of his confidence in ironclads as a means of winning the war. The ships architecture is unique to Confederate ironclads. Researchers have spent a great deal of time and resources in studying the progression of Confederate ironclad shipbuilding. Ironclads experienced several changes in their architecture, and each change strengthened the power of the ships, making them a viable threat to the Union cause. The *Neuse* represents a time in North Carolina history that helped to change America forever. The Civil War greatly impacted thousands of lives in the state. Much can be learned about life on the home front in Eastern North Carolina by studying the history of the ship and its crewmembers. Letters written by sailors stationed on board the *Neuse* have provided great detail about how the war affected civilians living in rural North Carolina. Finally, the *Neuse* Historic Site was located on the bank of the Neuse River, a major waterway used during the Civil War. The ship also shared space with the Governor Richard Caswell Memorial for over forty years. After the excavation, the state was in a major rush to find the ship a permanent home. The Governor Richard Caswell site was chosen because it was located on the Neuse River, and it was only a few miles from the original mooring site for the *Neuse*.

Another important criterion of a location is the potential uses of the site. Historic sites and museums put a great deal of effort into creating a complete experience for visitors. A good site or museum incorporates visual aids, hands on experiences, and audio aids, while also

⁶² Jann Brown, email conversation, jann.brown@ncdcr.gov, November 2011.

providing the visitor with an objective presentation of material. The combination of the Richard Caswell site with the *Neuse* allowed the sites staff to communicate a very broad military history in North Carolina. While visiting the site, patrons had the opportunity to learn Revolutionary history along with Civil War history, making the guest experience unique and complete.

The ship had two homes while sharing space with the Caswell Memorial. The original location of the *Neuse* was only a few yards from the river. This location was not ideal because it left the ship in the river's flood plain. Nonetheless, the ship was settled and a shelter was constructed around the surviving hull. Also, a museum was built to house the ship's 15,000 associated artifacts, and meant to serve as a welcome and learning center for visitors. Exhibits showcased the life of the *Neuse* and the home front in Lenoir County. Artifacts such as the ship's armaments, stoves, and personal items from the crew were on display. Unfortunately, in 1996 Hurricanes Dennis and Floyd destroyed the museum and partially submerged the hull of the ship. The museum was flooded and nearly all of the artifacts were harmed. They were sent to Raleigh for conservation treatment and repair. Some were left in Raleigh for nearly six years before they were returned to the *Neuse* Historic Site. Also, the flooding was cause for the ship's relocation to the Caswell Memorial. Another shelter was constructed to serve as partial protection for the surviving hull. The visitor's center was never reopened after the flood damage, but visitors were given tours of the ship that provided great insight to its history.

The *Neuse* remained at this second site until the summer of 2012, when it was relocated to downtown Kinston and the newly built CSS *Neuse* Civil War Interpretive Center. Moving the ship was no easy task, and required years of strategic planning, expertise, and an enormous amount of money. In order to move the ship, professional house movers were hired to relocate the hull to its home in the new museum. The ship was moved in the three pieces that original

excavators cut to bring the ship ashore. Trained professionals attached these pieces to moving dollies operated by joysticks, and began the 2.7 mile journey to downtown Kinston. The trip took a total of about three hours, and the ship arrived safely to its new home.⁶³ The building for the new museum was purchased by the Gunboat Association and was graciously donated to the state to serve as an interactive museum and North Carolina cultural destination. The new museum is expected to have its grand opening in 2014.

A third criterion for becoming a historic site is the site should also be historic rather than commemorative. In other words, the site should be authenticated by historians as a true historical marker. Sites that are built in remembrance of a specific subject do not qualify as true historic sites. Potential historic sites should enhance the North Carolina system of established historic sites. The location of the new CSS *Neuse* Interpretive Center is located across the street from its original mooring site in the Neuse River and the *Neuse II*, making the site more culturally and historically relevant. The *Neuse II* is a full-size replica of the *Neuse* and provides patrons with a more complete experience and allows for greater interpretation of the original ship.

Finally, as with any state program, money must be taken into consideration when deciding on a large investment such as developing a historic site. The site must be evaluated for its long-term outlook. Because many historic sites are funded by the state, yearly operational costs must be considered, along with capital requirements of the site over a twenty-year time frame and expected visitation levels during the year. The majority of visitors are school groups, and the most common grade levels that visit are fourth and eighth graders, because North Carolina curriculum has these grades studying North Carolina history. Currently the site will not

⁶³ North Carolina Department of Cultural Resources, "CSS *Neuse* Moves to Downtown Kinston", <http://news.ncdcr.gov/2012/06/14/css-neuse-moves-to-downtown-kinston>. (accessed February 12, 2012).

charge admission to tour the new museum, but donations will be gladly accepted. A portion of the site's budget is funded by the generosity of visitors. Cultural travelers in North Carolina spend on average 102 dollars, with the national average being 72 dollars. North Carolina's historic site system relies on visitor donations and expenses to fill the gap the state budget cannot afford. Also, in the case of the *Neuse* Historic Site, the Gunboat Association located in Kinston generously supports operations of the site.

Many historic sites in North Carolina are operated by the state and most get the majority of their funding from the state. Each year the state legislature develops a budget for the coming year. A portion of the budget is for the North Carolina Department of Cultural Resources (NCDCCR). NCDCCR is responsible for the daily operation of sixteen museums and twenty seven historic sites. The organization has just over 1,000 employees and has the smallest amount allotted to them in the state budget. Last year the money appropriated to NCDCCR equaled 71,996,844 dollars. Twenty-six percent of that money was allotted to fund all twenty seven historic sites.⁶⁴

Thankfully, NCDCCR does receive some federal grants to help cover the cost of maintaining forty three sites total. Unfortunately, because of the poor economy, many historic sites are struggling financially, and the CSS *Neuse* historic site is no exception. Many sites are being forced to reduce the amount of interpretation because they cannot afford to pay interpreters. Staff members are always on the lookout for new and creative methods to save their site money. The historic site system is vital to tourism in North Carolina. The legislature should be mindful of the benefits of having such a wonderful resource that brings a great amount of capital into the state. Much like the history of the CSS *Neuse* State Historic Site, museums all

⁶⁴ North Carolina Department of Cultural Resources, *Cultural Resources at a Glance*, <http://www.ncdcr.gov/atagance.asp>, (accessed November 20, 2011).

over the United States have evolved and developed into professional institutions. The historiography of museums is integral to understanding how the new CSS *Neuse* Civil War Interpretive Center has and will continue to develop.

6.2 Historiography of Museums

Museums are an integral part of our society. John Elsner and Roger Cardinal believe that “collecting contributes some degree of harmony and stability to society at large.”⁶⁵ They also believe that collecting has a social function in its role of a market economy.⁶⁶ These thoughts are developed in their collection of short essays called *The Cultures of Collecting*. Other scholars such as Russell W. Belk in *Collecting in a Consumer Society* (1995) assert that collecting is a healthy activity that stimulates consumer life with passion. In his book he treats collecting as a form of consumption and also believes that collecting is a sign of a healthy economy. In North Carolina, the average traveler spends about 102 dollars on cultural programs each year.⁶⁷ Museums and historic sites have a large influence on how society views history.

Historically, the role and function of museums has changed greatly. The evolution of museums as institutions has directly paralleled the professionalization of the history field. In his book *That Nobel Dream*, Peter Novick describes the transition of history from discipline to profession of. He suggests that hundreds of years ago the study of history belonged to the upper class. In the United States “original” historians were wealthy Americans who could afford to travel to Germany to study under professional historians. Men who wanted to study history needed to have a true passion for the subject. He who pursued knowledge “was to be sharply distinguished from the ‘hackney professional’—he was rather a sanctified member of a

⁶⁵ John Elsner and Roger Cardinal “The Culture of Collecting” quoted in Tanselle, *A Rationale of Collecting*, 23-50.

⁶⁶ Russell W. Belk *Collecting in a Consumer Society* quoted in Tanselle, *A Rationale of Collecting*, 23-50.

⁶⁷ North Carolina Department of Cultural Resources, *Cultural Resources at a Glance*, <http://www.ncdcr.gov/ataglance.asp>, (accessed November 20, 2011).

‘remnant’ within society.”⁶⁸ As history progressed as a profession, a broader range of person was invited to study history. The subject became acceptable for individuals outside the upper class to study. As time progressed, theories about how history should be studied and views on objectivity changed. During the age of description in the 1900’s, professional historians began filling jobs in museums. With this transition, historians brought with them their thoughts about objectivity. Collections began to evolve to include artifacts that tell the whole “story” of history.

Collecting was the source of competition between museums and private collectors for many years. Eventually, private collectors and museums were able to come to a mutual agreement that could benefit both. Private collectors began donating their collections. This helped the museums by adding to their collections and their resources for teaching the public. The North Carolina Museum of History received a portion of their collection from its founder Fred Olds’ private collection. In the 1970’s and 1980’s not much was known about analyzing artifacts for information. Today, museums provide the public with an opportunity to learn history through artifacts.

6.3 The Importance of Artifacts in Museums

The progression from partial shelter to full museum and historical center was long awaited by the state and local community. Staff of the new museum now face the challenge of creating an interactive and engaging environment centered around one of North Carolina’s largest artifacts. The professionalization of museums brought forth new insight into the potential for the use of artifacts in museums, a fortunate shift for the staff of the new *Neuse* museum. The history of the use of artifacts as teaching tools is one that holds great importance and is central to the interpretation of the *Neuse*.

⁶⁸ Peter Novick, *That Noble Dream: The Objectivity Question and the American Historical Profession* [Cambridge: Cambridge University Press, 2007], 21-47.

The 1960's brought a change in the way historians thought about the use of artifacts in their field. For many years historians solely relied on manuscripts and other written records to attain knowledge and conduct their research. In 1964 John A. Kouwenhoven challenged this perspective in his article "American Studies: Words or Things?" He argues historians have become far too comfortable with accepting verbal evidence rather than using the senses to reach historical conclusions. He writes "I shall argue that we have been so preoccupied with words that we have neglected things; that we have, in fact, based our ideas of America primarily upon ingenious verbal generalizations that are sometimes laughably and sometimes tragically unrelated to actualities"⁶⁹ The primary focus of his argument is his belief that words are deceptive and misleading. Words often generalize subjects and fade them so that our senses cannot perceive them. Due to these concerns and problems with words and the written language, Kouwenhoven suggest that artifacts should be used in the study of history. He argues that words do not have meaning but rather they can only convey meaning. Also, words are only effective on those individuals who share the same life experiences. Objects, on the other hand, have the ability to unite people in their understanding of history. For example he says "All of us, insofar as we rely upon our senses rather than upon verbal preconceptions, would acknowledge that American culture is expressed more adequately in the Brooklyn Bridge than in the poem Hart Crane wrote about it."⁷⁰ This notion is particularly important to museums because it suggest that artifacts lend greater understanding than panels upon panels of information.

Authors Wilcomb E. Washburn and John T. Schlebecker, in their individual articles "Manuscripts and Manufacts" and "The Use of Objects in Historical Research" support the use of artifacts as learning tools in the history field. These articles are particularly relevant to the

⁶⁹ Thomas J. Schlereth ed., *Material Culture Studies in America*, [Lanham, MD: AltaMira Press, 1999] 81.

⁷⁰ *Ibid* 87.

new *Neuse* Interpretive Center because the new museum is based on the interpretation of the ship's surviving hull. Visitors receive a more complete experience by being just feet away from the actual ship. The greatest feature of the new museum is the mezzanine floor, where visitors are granted a birds-eye view of the hull. This perspective allows for greater understanding of the ship's size and power. A "ghosting" of the decking, casemate, and smoke stack is suspended from the ceiling, giving patrons a better understanding of the magnitude of the ship. Washburn speaks of this kind of first-hand experience in his article.

The few manuscript remains concerning the three ships that brought the first settlers to Virginia have one of the power to represent that experience that the reconstructed ships have, despite the imaginative assumptions made in building them. Anyone who has seen the Virginia ships at Jamestown, or better still, sailed in them on the Chesapeake Bay knows how forceful an expression of the meaning of a seventeenth-century sea voyage these objects are.⁷¹

Schlebecker also agrees with the idea that well used artifacts, and even an accurately built replica aids visitors in understanding historical events. The *Neuse* has a wonderful opportunity to partner with the *Neuse II* in communicating the ships history to the public. The replica is an almost exact representation of the original *Neuse*. Some few exceptions include the size of the planking and sleeping quarters, but these are minimal differences that do not affect the interpretation of the ships history. One of Schlebecker's primary arguments is "What students learn depends to a great extent on what experiences the examiner brings to the object, and also on what the observer wants to learn. Thus, individual reactions to things vary, but all can learn something from objects, just as all can learn something from history."⁷² He strongly believed that artifacts contribute greatly to the visitors experience and should be the primary teaching medium used by museums.

⁷¹ Thomas J. Schlereth ed., *Material Culture Studies in America*, [Lanham, MD: AltaMira Press, 1999] 103.

⁷² *Ibid* 109.

Most museums are in full agreement with these ideas and incorporate artifacts into their exhibits and visitor experiences. Schlebecker goes one step even further, and suggests that objects should be, if at all possible, handled, touched and lifted. During the *Neuse's* recent history, visitors were allowed to walk on the inside of the hull. This experience certainly contributed to patrons understanding of the scale of the ship, but caused significant damage to the integrity of the wooden hull. Visitors are no longer allowed to walk on the ship, but are granted excellent views of the ship from the ground and mezzanine floors.

The new CSS *Neuse* Interpretive Center also employs artifacts found among the wreckage. The ship's associated artifacts comprise the largest collection of artifacts belonging to a Confederate ironclad. In the past, museums served as housing for arbitrary collections of artifacts without regard to their relevance or educational value. Often times museums accepted any artifact that patrons wished to donate. As museums have become more professionalized, this practice has come to a stop. Museum professionals are careful when building their collections, bearing in mind artifact relevance, use, and educational value. The *Neuse* collection was comprised much differently by default because every artifact was found on board or near the ship in the Neuse River. Still, the staff of the new interpretive center should be mindful of their artifacts potential for educational value.

According to G. Ellis Burcaw, museums have become institutions of research and artifacts are the subjects of their study. He says "If museums are to claim the prestigious title of 'educational institutions,' they must study their collections in depth and interpret them, not merely show what they have collected."⁷³ The *Neuse* artifacts have great potential for providing new information concerning Civil War history. For example, many of the canister shot described in previous chapters contain unique information such as methods of manufacturing, and how the

⁷³ G. Ellis Burcaw, *Introduction to Museum Work*, [Lanham, MD: AltaMira Press, 1997] 122.

shot were used on board the ship. Further research of the full canister shot set along with hammers also found on board reveal that the crew may have spent their days manufacturing the small iron pieces that were mixed in with the round canister shot. There are countless other artifacts within the *Neuse*'s collection that could reveal pertinent and new information about the life of the ship and the Civil War in North Carolina.

It is evident that artifacts are extremely important to museums as educational institutions. One very important factor in the effectiveness of artifacts is how they are presented in museums. As museums have become more professional, they have been more selective in what artifacts they display and which they keep in their collection. Artifacts that are used for public display are typically in the best condition and are unique. Curators are careful not to include multiple artifacts for display. This is not to say that museums only collect one of each artifact, but rather they keep multiples behind closed doors and use them primarily for research purposes. A curators primary goal is to use artifacts to effectively communicate history to the public. Artifacts are used in conjunction with text panels to engage visitors in the history experience. Most museums curators use a set of artifacts to tell a story, but due to lack of collection space many museums opt for open storage. This type of exhibition can be effective if executed properly. Burcaw says "Increasingly in recent years, a new solution has been successfully tried and received by the public. It is intentional open storage; having as an adjunct to regular interpretative exhibition areas other spaces in which the bulk of the related collection can be shown." The *Neuse* Interpretive Center staff has employed this technique in the new museum. Due to the immensity of the *Neuse* collection, the new museum features a large storage vault where artifacts may be safely stored. This vault will be open to the public to allow visitors to appreciate the vastness of the collection. Exhibit design is extremely important to the success of

museums. The new *Neuse* museum is state of the art and employs the most modern and effective educational techniques.

6.4 Effective Museum Design and Interpretation

Former Deputy Secretary of the North Carolina Office of Archives and History, Jeffery J. Crow, wrote in *Carolina Comments* “Currently located in eastern North Carolina, the region of our state most affected by the war, the *Neuse* site offers an opportunity for furthering one’s understanding of the events of the war, its participants, its consequences, and its meaning for today’s North Carolinians.”⁷⁴ The site has a wonderful opportunity to share an important component of North Carolina and American history. In order to effectively communicate this history to the public, effective design and interpretation techniques must be employed by the sites staff.

In his book *Introduction to Museum Work*, Burcaw describes the importance of visitors and interpretation. According to him, museum visitors should be viewed as customers entering a business. “The museum should so deal with its customers that they will become its public relations ambassadors and recommended its product to others.”⁷⁵ The average visitor is not interested in coming to a museum to read large amounts of text. They would rather be given historical information via docent rather than discover the information for themselves. For this reason, creative exhibit designs are imperative to successful museums. Effective exhibits are accessible to all visitors. The American Alliance of Museums (AAM) provided guidelines for basic modern exhibit design. A well designed exhibit “is successful if it is physically,

⁷⁴ Jeffery J. Crow, “The Civil War in Eastern North Carolina: A New Opportunity for Interpretation,” *Carolina Comments* (vol 47, Number 4, July 1999), 88.

⁷⁵ G. Ellis Burcaw, *Introduction to Museum Work*, [Lanham, MD: AltaMira Press 1997] 150.

intellectually and emotionally engaging and accessible to those who experience it.”⁷⁶ It should be noted while these guidelines are universal for all types of museums, they should not be viewed as prescriptive. “We should always allow for purposeful—and often brilliant—deviation from the norm.”

There are seven standards for museum exhibitions that the AAM considers to be important. These standards should be applied to the *Neuse* museum as a whole because its primary objective is to interpret the history of the ship to the public. The first of which is audience awareness, and this component is mindful of intended audiences’ prior knowledge, interests, learning styles, attitudes, or expectations about the topic. In the case of the CSS *Neuse* Interpretive Center, the primary targeted audience is eastern North Carolinians. Specifically, the population of Lenoir County is 40.7% African American, an obvious challenge to presenting a Confederate ironclad.⁷⁷ The site’s staff was aware of this challenge and has made a conscious effort to defuse hostile attitudes towards the subject. The new museum has plans to incorporate African American history associated with eastern North Carolina and with the specific history to the ship. Also, another major component of the museum’s visitors will be school children. The staff was also mindful of the North Carolina Standard Course of Study and has incorporated elements of interest of both students and teachers alike.

The second standard, evaluation, can be closely associated with the first. This standard ensures that the newly developed exhibit is tested and assessed after the opening of the exhibit to understand its impact on the audience in relation to the project’s goal. This ensures that the exhibit is effective in its interpretation, and allows for corrective adjustments. The new museum

⁷⁶ Professional Networks Council of the Alliance of Museums, *Standards for Museum Exhibitions and Indicators of Excellence*, [American Alliance of Museums], name-aam.org/about/who-we-are/standards (accessed February 10, 2013).

⁷⁷ North Carolina, *State and County QuickFacts*, <http://quickfacts.census.gov/qfd/states/37/37107.html> (accessed February 12, 2013).

plans to hold a “soft opening” during the early months of 2013. During this time staff will be able to attain a greater understanding of visitor expectations and reactions. This period will allow for improvements that will enhance the museums exhibits and interpretations.

The third component is content of the exhibit. The “content is thoroughly researched and vetted for accuracy, relevance to exhibition theme/s, and the current state of topic knowledge.”⁷⁸ The new interpretive center has an advantage in favor of this component. The staff is extremely well versed in the historical information regarding the ship and the Civil War in eastern North Carolina. The site has interpreted the ship and time period to the public for over forty years. Plans for the new museum incorporate all of the sites staffs past experience with the latest state of the art museum techniques. Preliminary exhibit plans incorporate all facets of the war in Eastern North Carolina. The second floor of the museum is dedicated to exhibit space and will house up to six small exhibits. The first two exhibits focus on causes and the early days of the war in North Carolina. The third exhibit details life on the home front, and focuses specifically on Lenoir County. The fourth and fifth exhibits are the most important because they describe the life and military history of the *Neuse*. This information includes the construction, armaments, military engagements, and sinking of the ship. The largest display in these exhibits is the surviving hull and ghosting of the ship. The final small exhibit focuses of the lasting effects of the Civil War on the state and on the ship itself. Information detailed includes the impact of the war on Kinston and the recent history of the *Neuse*.

The fourth component of a well-designed museum is its collection. The surviving hull is one of the largest artifacts owned by the state of North Carolina, and the associated artifacts comprise the largest collection of artifacts belonging to a Confederate ironclad. As stated

⁷⁸ Professional Networks Council of the Alliance of Museums, *Standards for Museum Exhibitions and Indicators of Excellence*, [American Alliance of Museums], name-aam.org/about/who-we-are/standards (accessed February 10, 2013).

previously, since the museum is pressed for space, the majority of the small artifacts will be housed in the open storage area. The small exhibits revolve around the interpretation of the ship's hull. Smaller artifacts will be used to supplement panels of additional information concerning the war in North Carolina and life on the home front in Kinston. These artifacts should be mounted appropriately, keeping the stability of the artifact as a primary goal. Artifacts chosen should be of the best quality and be relevant to the written information on the panels. Carefully chosen artifacts in combination with well-written panels combine to create effective historical interpretation.

Interpretation and Communication is listed at number five among the most important components of a well-designed exhibit or museum. Successful interpretation involves an array of important factors such as well-trained, articulate staff and volunteers and incorporating visitor learning styles into creative outreach programming. The *Neuse* museum is very fortunate to have several well-trained and articulate volunteers to act as docents. All too often visitor experience remains lacking due to poorly trained volunteers. Museums rely on their volunteers to be the primary educators, and therefore spend a great deal of their efforts training them to become excellent teachers and guides. The volunteers at the *Neuse* Museum are very qualified and greatly contribute to positive visitor experience.

Each visitor to a museum has a different learning style. Some learn best by touching, others by reading or seeing history. Museum education professionals and exhibit designers should be mindful of visitors learning styles and incorporate elements of each into their exhibits. Tools such as touch items, colorful labels, interactives, and audio visual aids should be included into exhibits if possible. The *Neuse* Interpretive Center holds a great advantage for engaging interpretation because of its many living history demonstrations. The site has developed several

interesting demonstrations that pertain to the life and history of the *Neuse* including: knot tying, rope making, uniform talks, spinning and dyeing, civilian life talks, weapons firing, and historic games. Each demonstration allows visitors to experience history by allowing them to participate in each hands-on activity. Children especially are attracted to events such as living history demonstrations because it allows them to be active participants in their museum experience. Also, the *Neuse II* is conveniently located across the street from the new museum, and allows all visitors the opportunity to gain a greater understanding of living conditions aboard the ship.

Burcaw writes “The up-to-date museum prefers to make the visit of the school group a truly educational experience, not merely a holiday from classroom routine.”⁷⁹, the former being a major goal of the CSS *Neuse* Interpretive Center. The majority of students who visit the *Neuse* are between the fourth and eighth grades, due to the North Carolina Curriculum. Lesson plans written by the staff and interns will be provided to teachers via the museums web page. These lessons are designed to allow teachers to prepare their students for their visit as well as follow up on what they have learned after they have returned to school. Also, the living history demonstrations are available for students to enjoy as a component of their lesson while at the museum. Burcaw is correct when he says, “A museum visit by a school class can be, and ought to be, an impressive, event an uplifting experience.”⁸⁰ Museums can be some of the best resources for teachers to utilize while teaching the history of North Carolina.

The final two criteria for an excellent museum focuses around design and visitor comfort and safety. These two components are interlinked by the need for museums to make the visitors experience as enjoyable as possible. Exhibits should be designed with aesthetic choices in mind. Museum accessibility is a growing concern within the field, and gallery space should

⁷⁹ G. Ellis Burcaw, *Introduction to Museum Work*, [Lanham, MD: AltaMira Press, 1997] ,157.

⁸⁰ *Ibid*,161.

be designed with all types of people in mind. For example, exhibit designers should be mindful of color choices when designing informative panels. Contrasting colors should be chosen in order to accommodate individuals with visual impairments. Also, the gallery should allow enough room for the turning radius of a wheelchair or stroller, and artifacts should be mounted no higher than 41 inches above the floor. This design ensures that individuals who are seated can maneuver comfortably and have a clear view of all artifacts and information panels. Finally, on audio visual aids, captioning should be available for those with hearing impairments. Making these small simple adjustments can greatly enhance visitor experience for all guests. History belongs to everyone, and all people should be allowed to engage in the full museum experience.

Design and human comfort also entails adding amenities such as changing tables in bathrooms for mothers and fathers to better care for their children, open and inviting lobbies, and maps and restaurant lists for guests. The museum's first goal in public service should be excellent visitor service. Visitors are the best method of advertising a museum can utilize, and great consideration and time should be spent on visitor services. The new CSS *Neuse* Interpretive Center is a state-of-the-art facility that should make visitors feel welcome and comfortable. The lobby is open and spacious with a reception desk for the convenience of visitors, and the outside entrance is easily accessible from the street making it impressive, easy to find.

6.5 Moving Into the Future

The CSS *Neuse* State Historic Site has made great progress over the past forty years and has transformed itself into the new CSS *Neuse* Interpretive Center. This change is sure to bring about a greater understanding of the ship and its role in the Civil War in eastern North Carolina. The new museum's staff has made careful efforts to ensure that the site is well organized and

interpreted, and will serve as an educational institution for people all over North Carolina. As the museum progresses forward there are a few key points that the staff should be mindful of.

All great museums aspire to become accredited institutions, and the *Neuse* museum should be no different. Burcaw states “Accreditation by the AAM is certification by the museum profession that a museum is ‘is carrying on its affairs with at least a minimum level of professional competence’.”⁸¹ This process typically requires several years of professional operation and successful public relations. A museum may become accredited by hosting a peer group of museum professionals who rate the museums level of professionalism. If the museum is granted accreditation, the general public benefits by

raising the quality of museums in general, and by pointing out with a kind of ‘seal of approval’ those museums worthy of visitation and support. Accreditation benefits the individual museum by giving it a yardstick for self-evaluation and being accredited—is trustworthy in the matter of loaned exhibits and objects, and by that the particular museum is a worthy recipient of financial aid.⁸²

Accreditation can help establish a new museum as a great institution that is worthy of respect, and is something the CSS *Neuse* Interpretive Center should be striving towards.

Lastly, museums today have a great potential to serve as educational beacons within communities, and technology is at the forefront of this movement. The internet has provided museums with a unique opportunity to share their exhibits and artifacts with an unlimited amount of visitors. Museums can now build virtual exhibits and share lessons on their web pages for millions to access. This opportunity is particularly helpful to those who do not live within driving distance of the museum. North Carolina is a large state that is broken into three major geographic regions. Students living in the mountains cannot feasibly travel four hours to visit the *Neuse*, but thanks to the internet, their teachers could access the new museums web page and

⁸¹ *Ibid*, 200.

⁸² *Ibid*, 201.

introduce their students to the ship's history and impact on North Carolina. Also, virtual exhibits could be created to display the vast artifact collection associated with the ship. Hundreds of artifacts may never be seen by the public due to the sheer size of the collection. A virtual exhibit would allow visitors the opportunity to enjoy a greater amount of *Neuse* and Civil War history by further study of the artifact collection. Mike Wallace comments "Virtual museums provide a still more mediated relationship between users and objects by presenting information in varying formats on the World Wide Web portion of the Internet."⁸³ He further comments that if history museums wish to remain relevant in today's culture that they would "fully plunge into this new world."⁸⁴

The CSS *Neuse* Interpretive Center has a great future ahead of them. The museum is in its infancy and has potential to become a great museum. The museum is well thought out and incorporates all major components of becoming an excellent museum. In the future the staff should set goals for the museum to become accredited to gain further standing in the museum profession and in the local community. Finally, the staff should always be mindful to keep their sights set on changing museum trends and the future. Great opportunity lies in virtual exhibits and online interactives and lesson plans. With these established standards and goals for the future, the CSS *Neuse* Interpretive Center is certain to become an important cultural landmark in eastern North Carolina.

⁸³ Mike Wallace, *Mickey Mouse History and Other Essays on American History*, [Philadelphia, PA: Temple University Press, 1996] 105.

⁸⁴ *Ibid* 104.

Chapter 7.0: Conclusion

Stephen Mallory, Secretary of the Confederate Navy, was confident that the presence of ironclads would help bring the Confederacy to a victory. While these warships were a mighty presence in the south, the Confederacy lost the Civil War and most ironclads were lost or destroyed. The *Neuse* is one of 3 surviving commissioned Confederate ironclads, and the ship is one of the largest artifacts owned by North Carolina. Until recent years, it has been largely forgotten by the public and historians alike. The history of the *Neuse* has much to offer the public history field. Although the ship has an interesting military history, its recent history is filled with valuable information concerning the growing fields of artifact conservation and museums. This research aimed to discuss this vital relationship.

The *Neuse* was authorized in 1862 and built in Whitehall. The ship's purpose was to be to sail to New Bern to recapture the town from the Union, ensuring a strong Confederate presence in an important port town. The ship encountered several problems during its construction such as a lack of resources and being caught in a battle, today known as the Battle of Whitehall. The ship was finally completed in the spring of 1864 and ordered to sail to New Bern. Unforeseeably, the ship ran aground just one half mile into its maiden voyage. The *Neuse* remained stranded in the Neuse River for nearly one month before the water raised enough to free the ship.

By the time the ship was free, the campaign for New Bern was over and the vessel returned to its moorings in Kinston. In Kinston the ship served as a threat to Union forces, and helped to hold them at bay. The *Neuse* finally saw battle during the battle of Wyse Fork in November 1864. It was during this battle that the ship met the end of its military career. The ship was scuttled by its own crew in order to prevent it from becoming Union property. The ship

was set afire with the intention of complete destruction, but instead an explosion in the port bow sank the ship, causing it to rest on the bottom of the Neuse River. In 1865, after the official end of the Civil War, the United States Treasury auctioned the ship's iron plating, machinery and armament. No further excavations would take place until 1963, when three business men living in Kinston took it upon themselves to raise the ship from its 100-year-old grave.

The *Neuse* was excavated by salvagers who took personal pride in raising the ship from the river. The excavation took place in the early 1960's, and during this time views on collecting artifacts were beginning to change. Collecting was no longer a rich man's hobby, but rather museums began to view artifacts as teaching tools. During the time of the excavation the state did not have laws in place to prevent private excavation projects from occurring. Today, thanks to projects such as the *Neuse* and the *Modern Greece*, there are strict state and national laws prohibiting private digs that do not carry proper permitting. The original excavation of the *Neuse* was most definitely a labor of love, and the entire community was invested in seeing the ship excavated. Still today the community of Kinston has a strong attachment to the ship. Unfortunately, the ship did sustain damage during the excavation and due to the nature of the project, the conservation of the hull and the *Neuse* artifacts were directly affected.

Original conservators were working under a great shortage of time and resources. The 1970's saw the beginning of conservation as a discipline in the United States, and therefore treatments that took place during that time were largely experimental. This is most defiantly the case with the *Neuse*'s hull and the associated artifacts. Original conservators did not keep detailed records of their treatments, which proved to be difficult for future conservators working on the project. Due to poor storage and hurricanes, original treatments were rendered ineffective.

The wooden hull of the ship is cause for great concern because for over 60 years the wood has been exposed to natural elements such as temperature and humidity fluctuations, insects, bacteria and fungi, and visitors. Questions regarding the state of the wooden hull include the effectiveness of past treatments. In analyzing the wood with FTIR and SEM it was determined that the wood cell structure is very brittle, but does not contain bacterial or fungal damage as previous conservators once thought. Rather, deterioration of the wooden hull is most likely been caused by chemical reactions with the wood. Also, the original treatment of linseed oil penetrated all the way through the hull of the ship, information that is also contrary to what previous conservators believed. In order to protect the hull from future damage, conservators today should monitor the ship for changes since it is now safely located in a controlled environment.

Artifacts associated with the *Neuse* were also in desperate need of attention and care. Original conservation treatments are failing due to poor storage methods and hurricane damage. Many of the artifacts belonging to the ship are in need of repair. During this research approximately 30 objects were re-treated. It was proven scientifically that the original coatings on the artifacts were made of linseed-oil-rich urethane, confirming original treatment reports. Conservation of the iron objects treated was largely experimental and will serve as research material to future conservators working with unknown substances. It was discovered that the best method for cleaning the iron objects was a two-week-long acetone bath. The acetone loosened the protective coating from the surface of the shot, allowing it to be removed with a dental pick. The iron objects were then treated with a rust inhibitor, tannic acid, and sealed with Paraloid B-48 and microcrystalline wax. The shot are now in excellent condition and are now ready to be displayed in a museum exhibit. Other artifacts treated were copper alloy lids and two

wooden ladder rungs. Treatment for these artifacts was not experimental and was carried out in a traditional form. These artifacts are now also in excellent condition and are ready for exhibition.

Conservators play an extremely important role as museum staff. It is vital for collections to be well cared for in order to be able to utilize the artifacts as teaching tools. Museums have evolved from open storage houses to institutions of education and the role of artifacts is essential to this change. Today's museums employ artifacts to objectively interpret history to the public. The CSS *Neuse* Civil War Interpretive Center has a wonderful opportunity to design and develop new state of the art exhibits as the museum is being built. Also, the new museum will provide the state with a wonderful learning facility that will not only interpret the importance of the *Neuse* but also how the ship relates to the Civil War both locally and state wide.

The *Neuse* is a state treasure and much can be learned by studying its history. This research has provided insight into the connection of events and how each stage of the ship's past has directly affected the next. By studying this project it is evident that material culture plays a large role in museums today, and that conservation is a very important part of museum interpretation. Future work should be pursued to ensure *Neuse* is well cared for and protected. There is still much to be discovered regarding the analysis of the ship's hull, and a full condition report should be drafted before further conservation is pursued. Also, the collection of artifacts associated with the ship is vast and is in great need of repair and organization. Finally, the CSS *Neuse* Civil War Interpretive Center is a new and growing institution and will be in need of future volunteers in order to become a successful museum.

The *Neuse* has been forgotten by historians for many years, and therefore there is a multitude of research topics available for future students. Researchers could study the ship from

several points of view. For example, a historian might investigate the folk lore associated with the ship, or how the ship's history and presence in Kinston has affected the local community. Also, a public historian might choose to study effective methods of presenting a Civil War artifact to a primarily African American community. Finally, the site would greatly benefit from a study on effective education methods employed by other Civil War sites throughout the South.

There are also many opportunities for conservation students. The wooden hull of the ship is in great need of attention, and there is a great opportunity for an in-depth study on wood conservation. Samples should be collected from every area of the ship and analyzed for treatment effectiveness and degradation. Analytical methods such as Spectroscopy, Microscopy, and Gas Chromatography should be conducted because it is essential that the state is well informed on the condition of the ship. This will allow conservators to plan for appropriate conservation treatments that can be applied in the future. Also, the artifacts associated with the ship are in great need of re-treatment. An in-depth condition survey should be conducted. Providing a condition report of the artifact collection, the researcher could then study effective methods of collection management and its importance to museum interpretation. Finally, much is still to be learned regarding the original conservation methodology and treatments. Chemical analysis could also be employed to gain a greater understanding of exact treatments used to conserve the artifacts. There is much work to be done, but as one of North Carolina's most important artifacts, the *Neuse* is due our attention and respect.

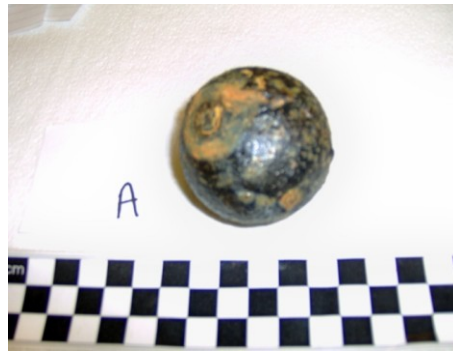
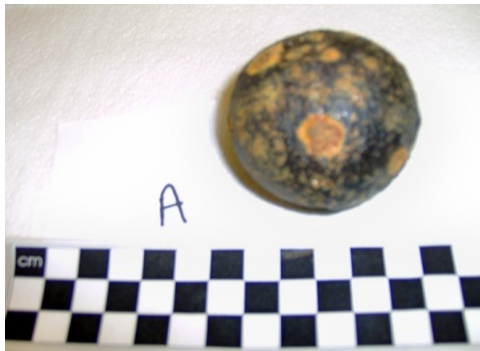
Appendix

The following is a list of before and after treatment photos of artifacts treated for the purposes of this research project.

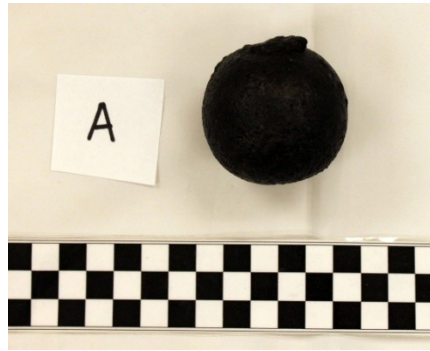
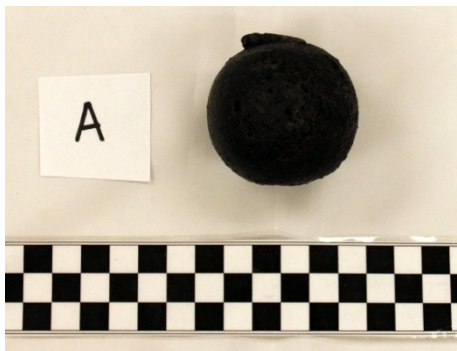
Iron Objects

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- Before Treatment

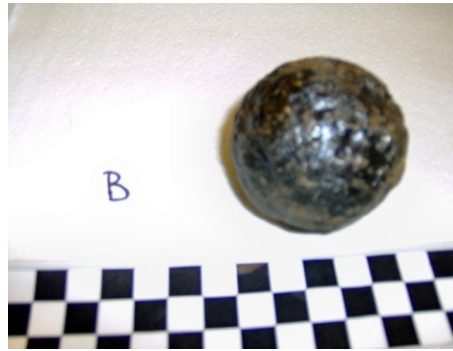


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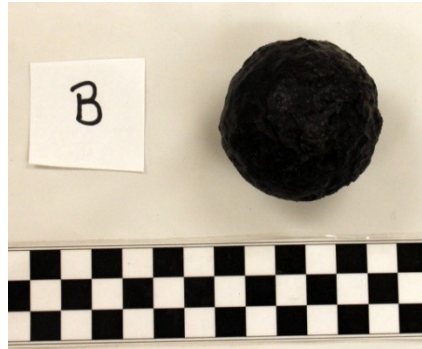
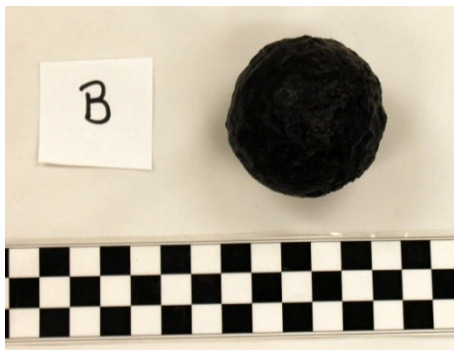


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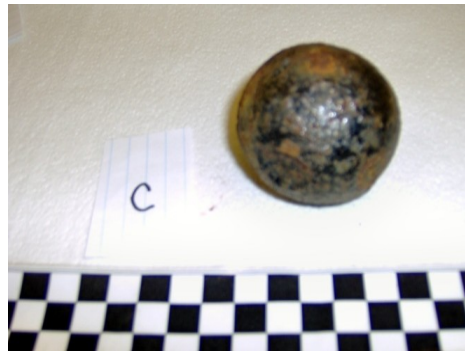
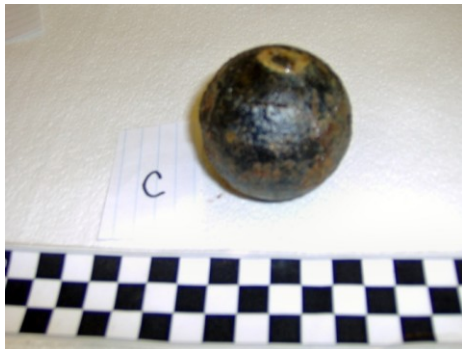


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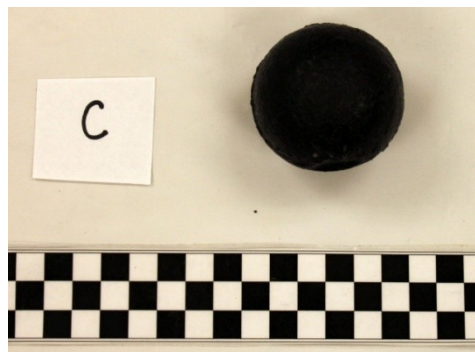
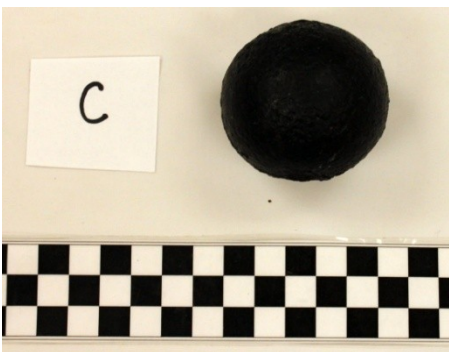


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- Before Treatment



- After Treatment

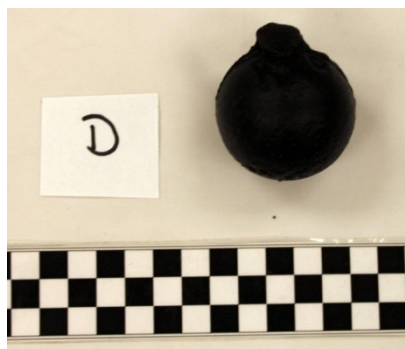
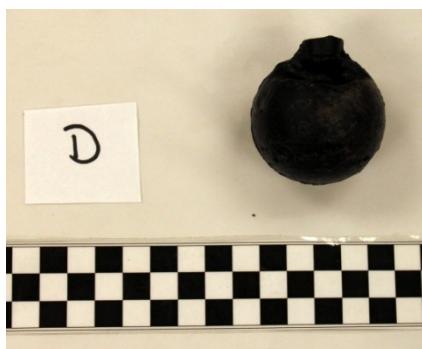


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- Before Treatment



- After Treatment

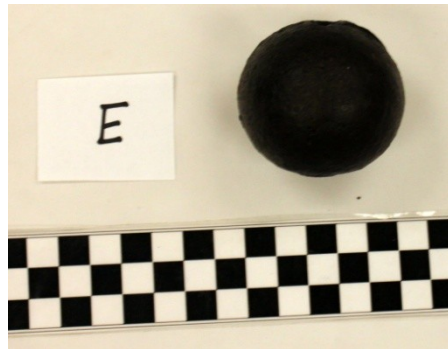
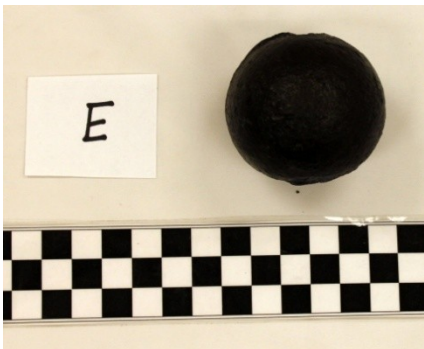


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- Before Treatment

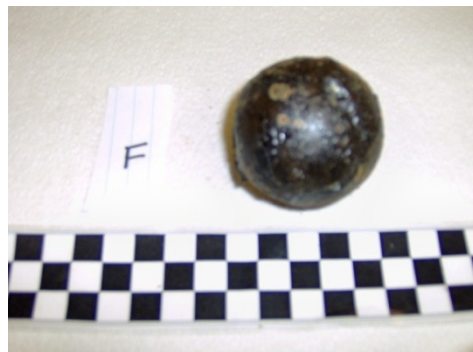
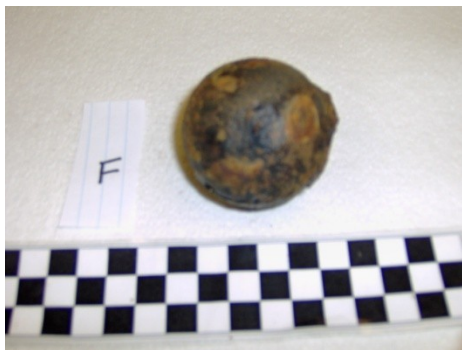


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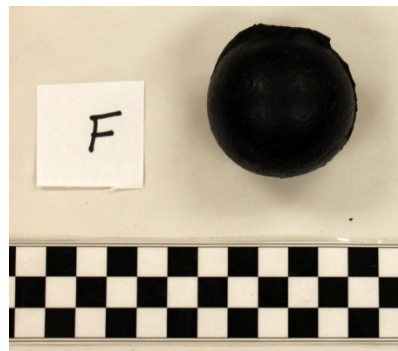
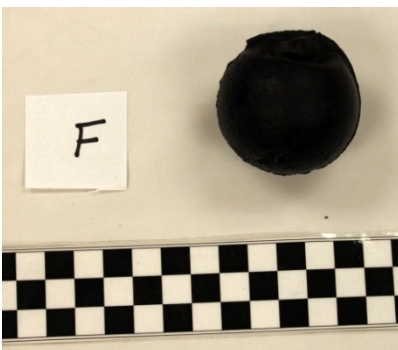


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- Before Treatment

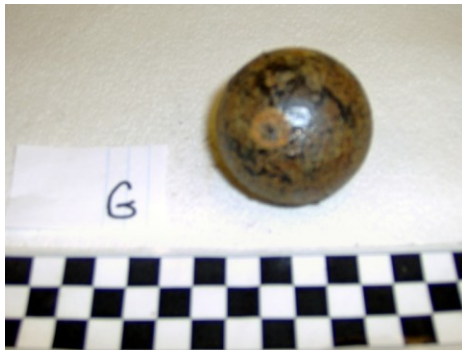


- After Treatment



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- Before Treatment

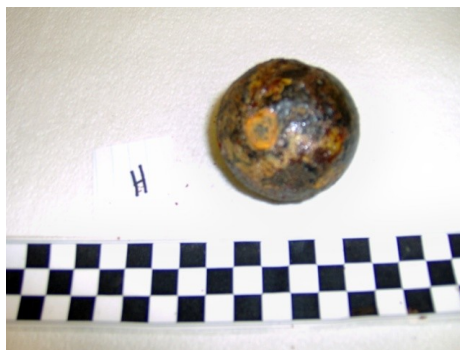
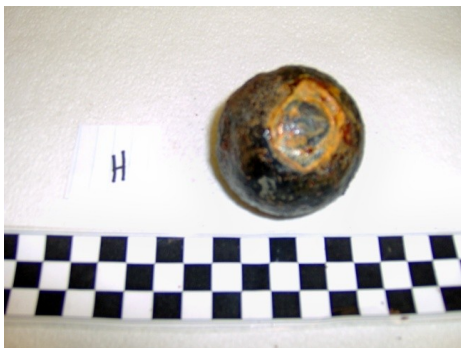


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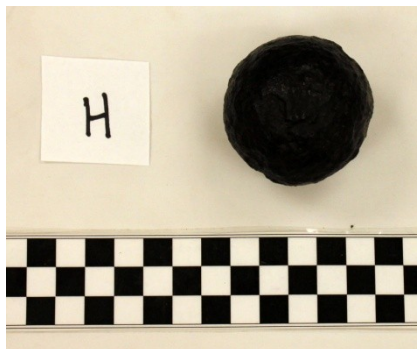
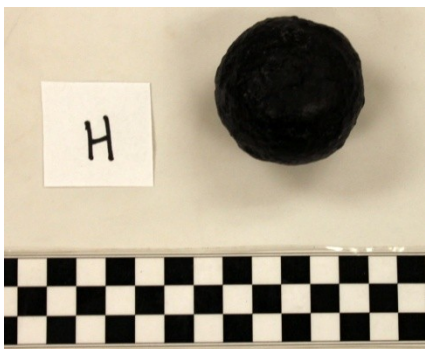


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- Before Treatment



- After Treatment

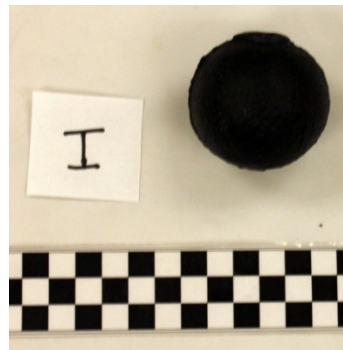
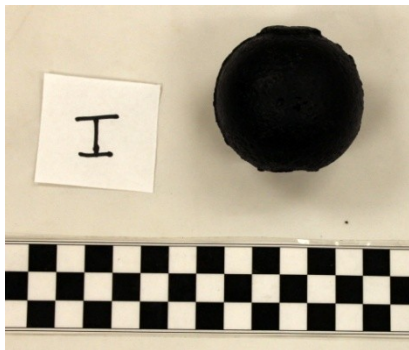


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- Before Treatment

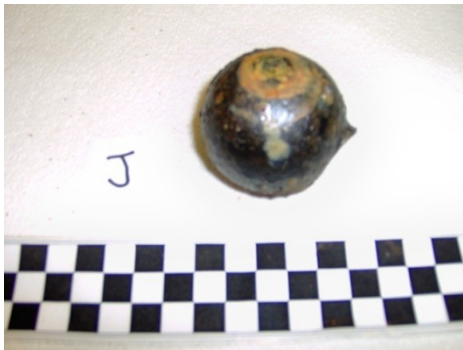


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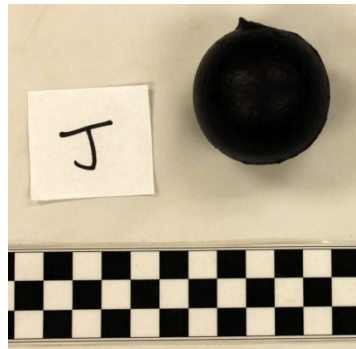
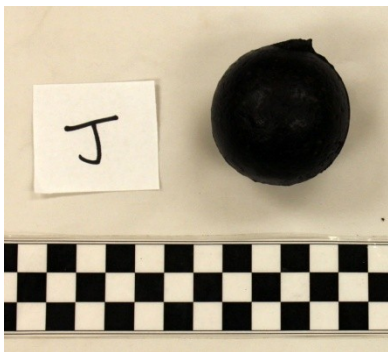


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- Before Treatment

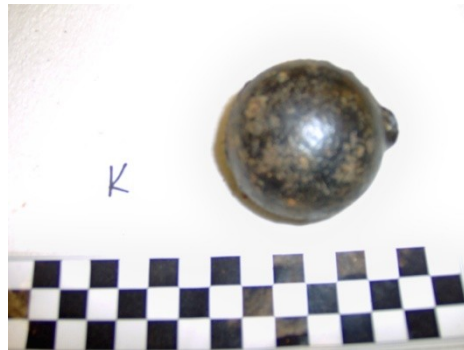


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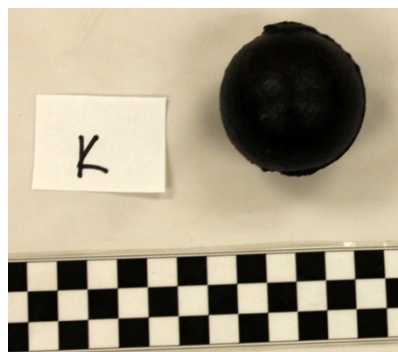
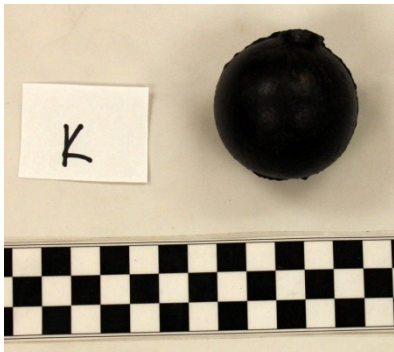


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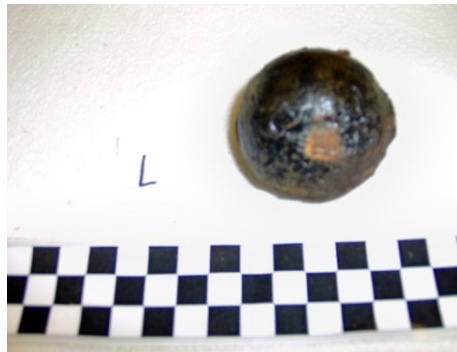
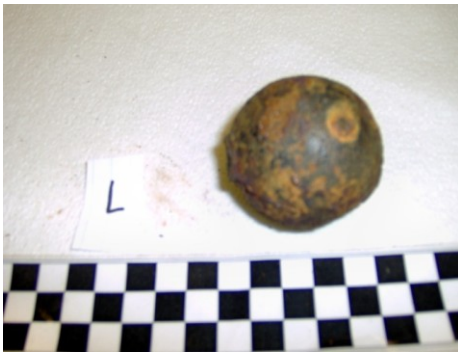


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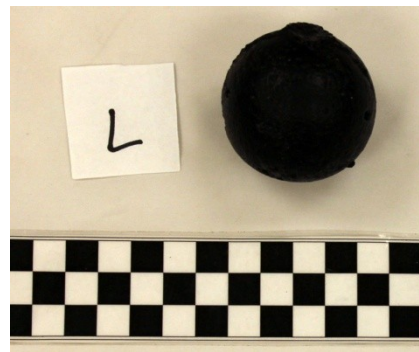


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- Before Treatment

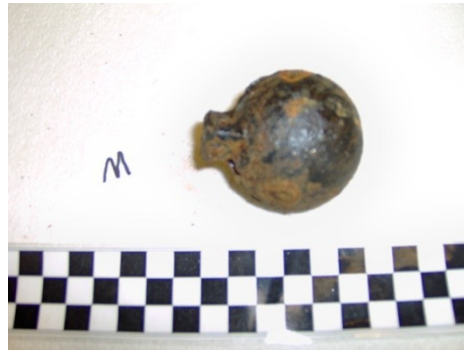
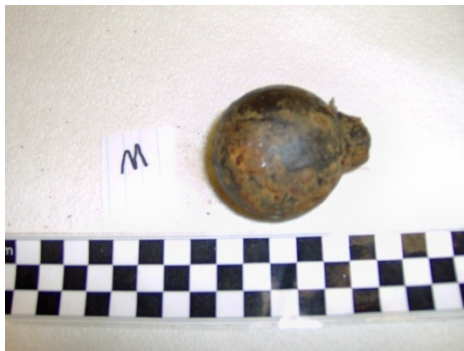


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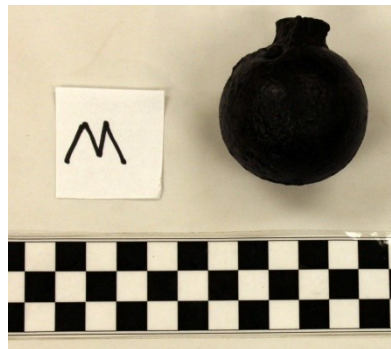
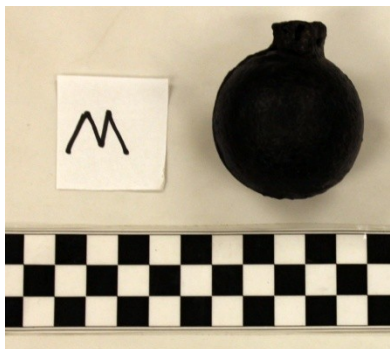


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- Before Treatment

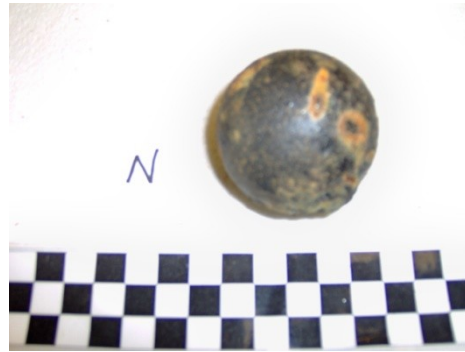
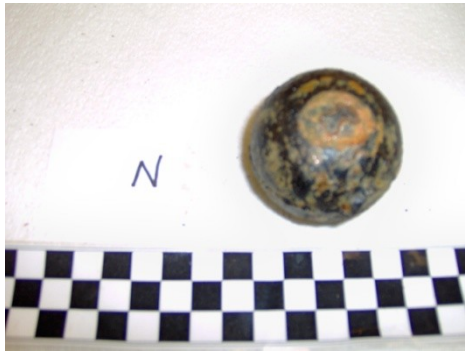


- After Treatment

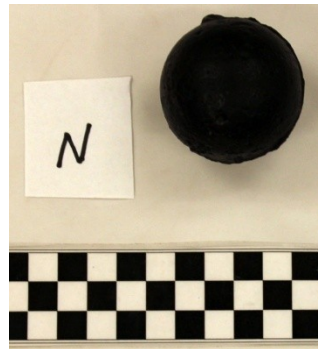
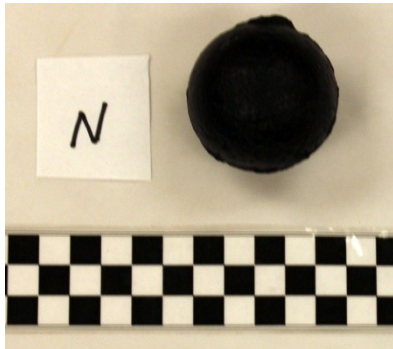


ECCL.2012.002.001N

- Before Treatment

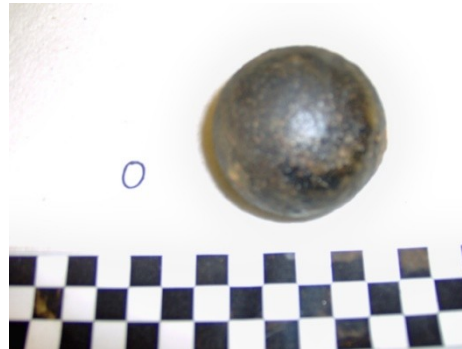
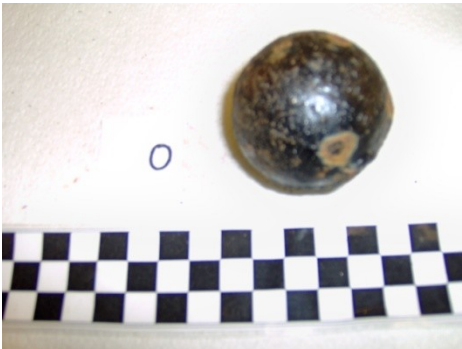


- After Treatment

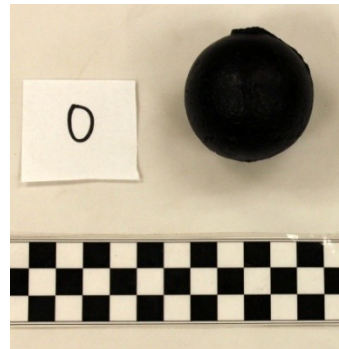
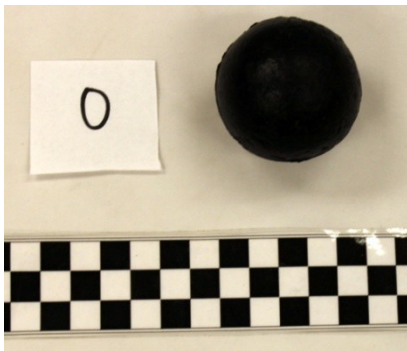


ECCL.2012.002.0010

- Before Treatment

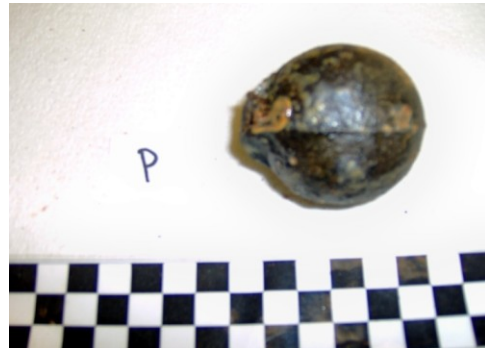
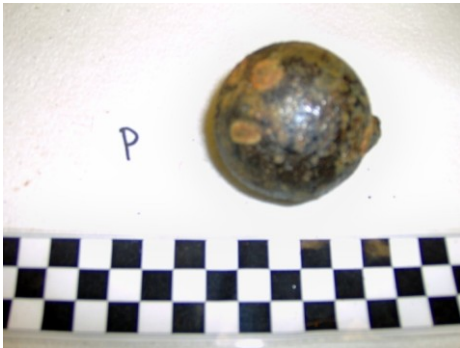


- After Treatment

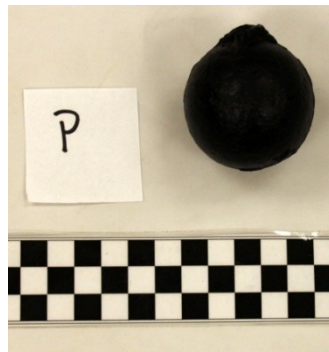
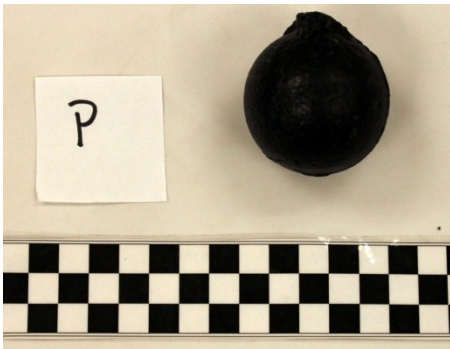


ECCL.2012.002.001P

- Before Treatment



- After Treatment



Copper Alloy Artifacts

ECCL.002.002

- Before Treatment



- After Treatment



ECCL.2012.002.003

- Before Treatment



- After Treatment



Wooden Artifacts

ECCL.002.004A

- Before Treatment



- After Treatment



ECCL.2012.002.004B

- Before Treatment



- After Treatment



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