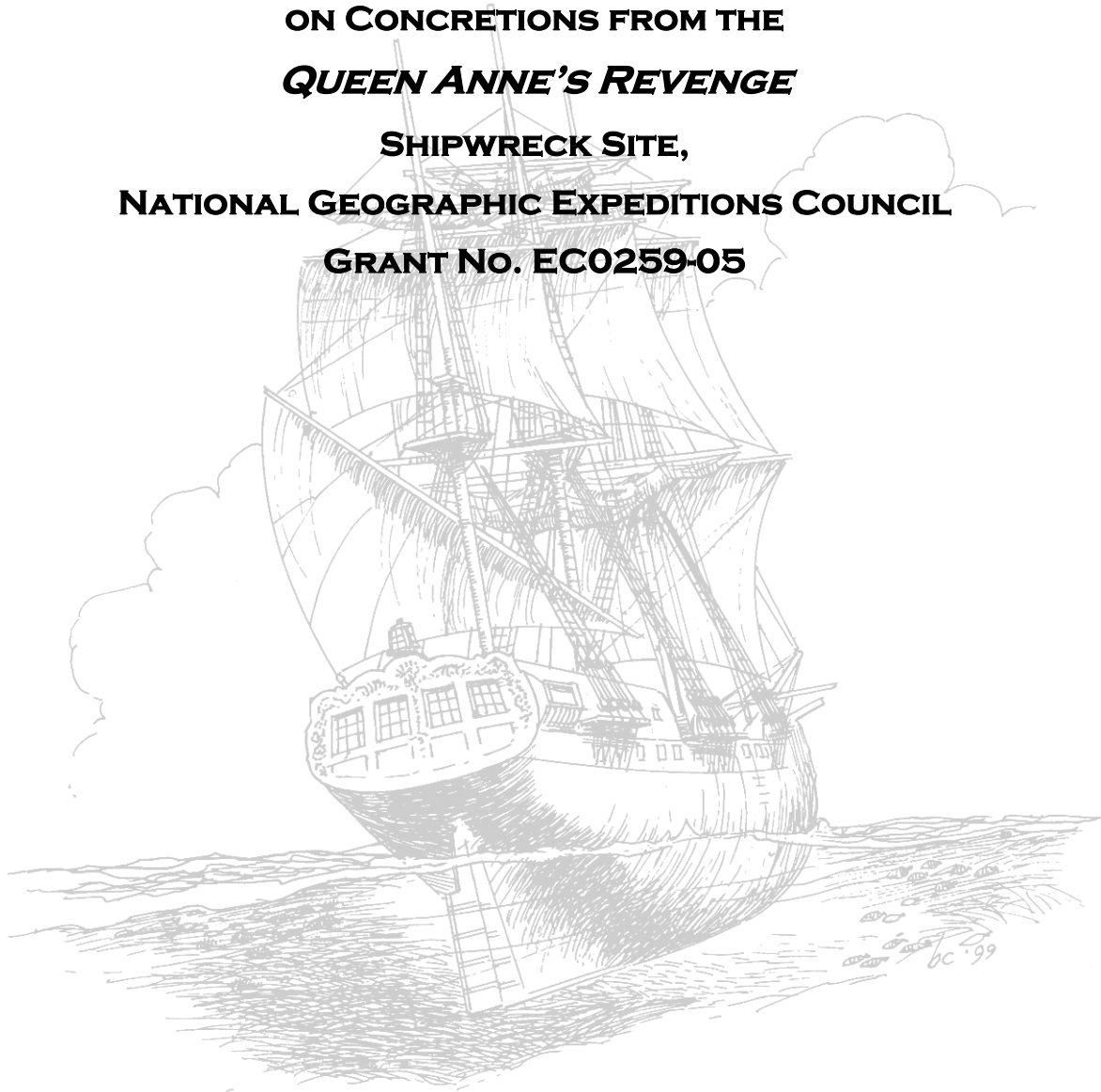


**FINAL REPORT ON PEERING INTO A PIRATE'S  
TROVE: A PROPOSAL TO CONDUCT  
HIGH DEFINITION RADIOGRAPHY  
ON CONCRETIONS FROM THE  
*QUEEN ANNE'S REVENGE*  
SHIPWRECK SITE,  
NATIONAL GEOGRAPHIC EXPEDITIONS COUNCIL  
GRANT No. EC0259-05**



Submitted January 3, 2008

By

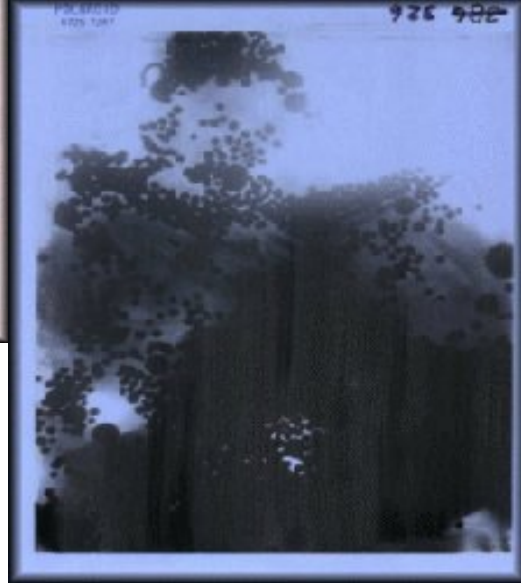
Wendy M. Welsh, Assistant Conservator  
Mark Wilde-Ramsing, Director,  
*Queen Anne's Revenge* Project

The above grant was received from the National Geographic Expedition Council on October 25, 2005. Grant funds were provided to and administered by the North Carolina Maritime History Council in order to purchase film, processing chemicals, image scanning services, equipment, archival storage and supplies to carry out the investigation of artifacts contained within concretions recovered from the pirate Blackbeard's flagship, Queen Anne's Revenge (QAR). This significant and internationally recognized heritage resource is listed on the National Register of Historic Places and declared a protected area. It is the oldest shipwreck discovered in the state, holds a wealth of information concerning early eighteenth-century seafaring, and is capable of providing a window into a unique period in the New World. The ship's apparent association with piracy and Blackbeard draws worldwide attention.

### *Objectives*

The NG Expedition Council funded project called for x-radiography of 300 concretions recovered during 2005. Because of foul weather conditions that spring and later in the fall recovery was not completed until the spring 2006. A total of twenty-three 5-foot x 5-foot units produced a total of 304 concreted objects. This recovery completed a stratified sampling of materials across the entire shipwreck to insure that a comprehensive collection of artifacts was achieved prior to major disturbance by hurricanes. This project also provided consistent sampling across the shipwreck site to assist in site interpretation and planning for full recovery.

X-radiography has proven to be an effective, non-destructive technique to investigate concretion contents. The process provides information about the form, material type and spatial relationship of artifacts held within a concretion. Concretions are accumulations of sand, carbonates, marine life and iron corrosion products, which form around iron artifacts and often incorporate a range of other objects and materials that were in close proximity at the time of loss. Since concretions have the appearance of amorphous lumps varying in size from an inch to several feet or more in length, individual artifacts contained within a concretion are usually not apparent at the time of their recovery from the site.



**Concretions, such as QAR 326.000, reveal little about what is contained inside. X-radiography found hundreds of lead shot and a gunlock buried within.**

Radiographic imagery provides information crucial for archaeologists and conservators charged with prioritizing concretions and deciding which are in need of immediate cleaning and artifact extraction. Interpretation of the radiograph offers data concerning the physical condition of artifacts within (for example break lines or fracture lines) as well as the degree of degradation. It is important to know whether a metal object is solid or extensively corroded. In some cases, only a void may survive from a once solid object. Once the decision is made to conduct further investigation, the x-radiograph provides a 'map' to guide the excavation of the objects from the concretion. For items such as the numerous sections of iron cask hoops contained in the collection, the imaging allows recording of basic information in preparation for long-term storage.

All x-radiography was conducted at the NC Museum of Art, Raleigh, North Carolina using their powerful x-ray system. The museum provided equipment use and staff time at no cost to the QAR project. A total of twelve sessions were conducted from October 2005 to June of 2007. The QAR conservation team was able to x-ray all recovered concretions with the exception of two medium size and forty small (less the six inch) concretions. Besides providing a wealth of information concerning the artifact assemblage and the

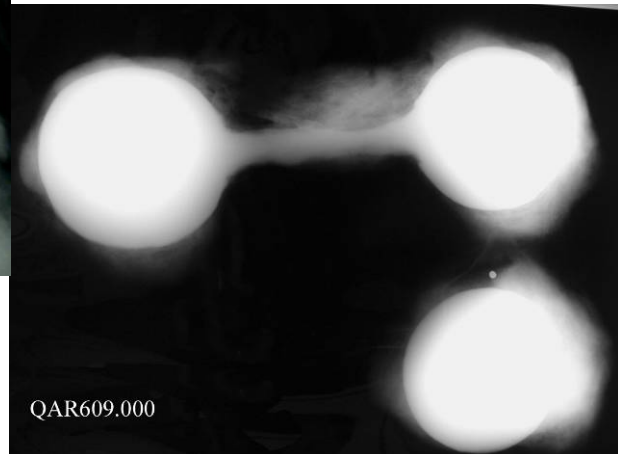
shipwreck site, the project provided conservators considerable experience and practice using x-radiography to examine concretions of all sizes. This honed their ability to reveal both individual artifacts and surface detail. Because of the invaluable experience gained by QAR staff and highly rewarding results, the QAR project was able to garner state funding this year to procure a similar x-ray system that will be housed at the QAR conservation laboratory in Greenville. This will help process an estimated an estimated 7,000 concretions that will eventually be recovered from the shipwreck.

### ***Results***

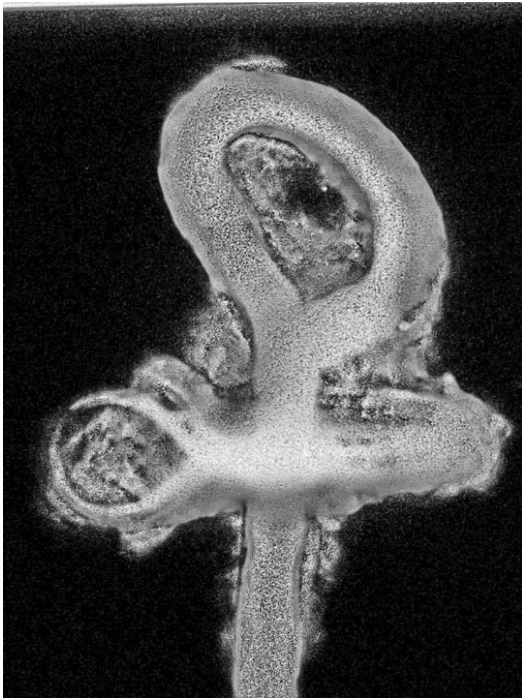
X-radiography revealed a wide range of artifact types from the ordinary (nails, ring bolts, and iron cask hoops) to the ornate (brass buttons, glass beads, and a small coin weight with tweezers). All artifacts provide important information, however the discovery of a set of shackles and a stemmed wine glass provided a very real and tangible link to the long ago seafaring past. Some of the highlights are shown below:



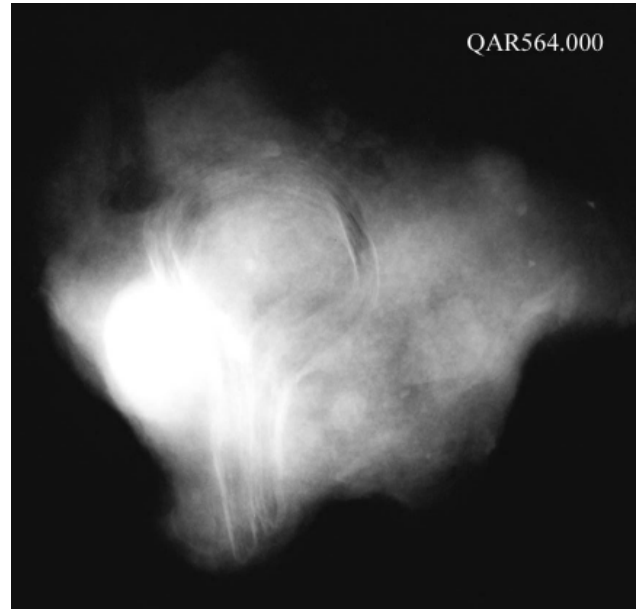
**Brass coat button (12-01-05)**



**A double headed cannonball (01-31-06)**

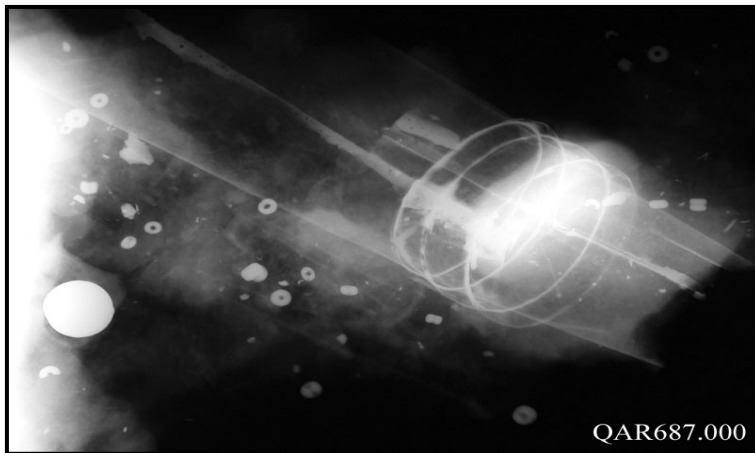


**An leg iron or shackle (11-22-05)**



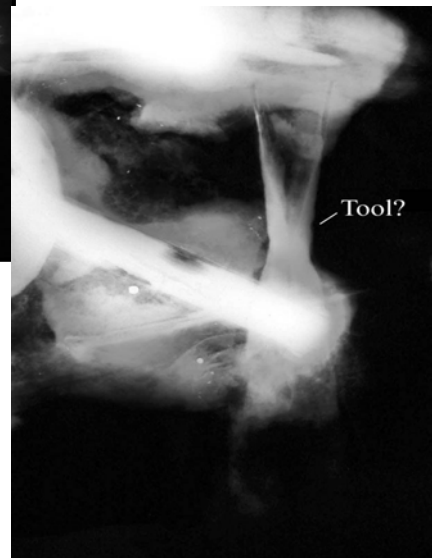
QAR564.000

**A musical jaw harp (11-22-05)**

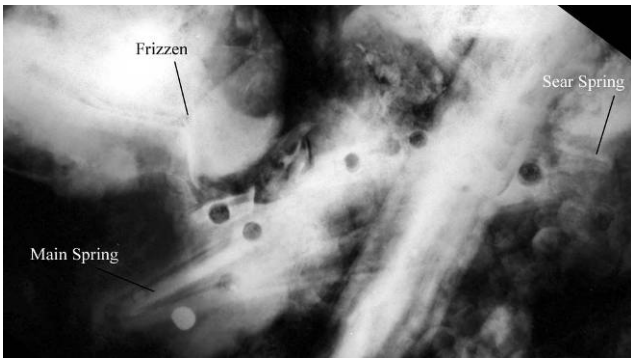


QAR687.000

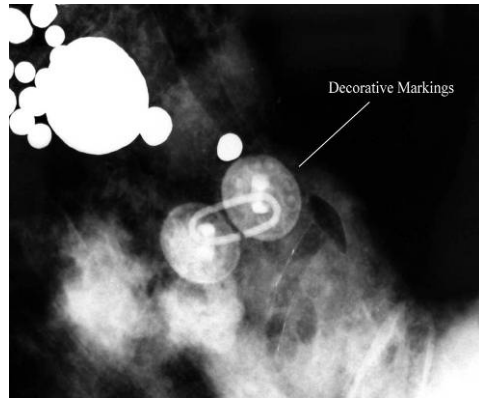
**Beads, lead shot, and a spy glass case (03-02-06)**



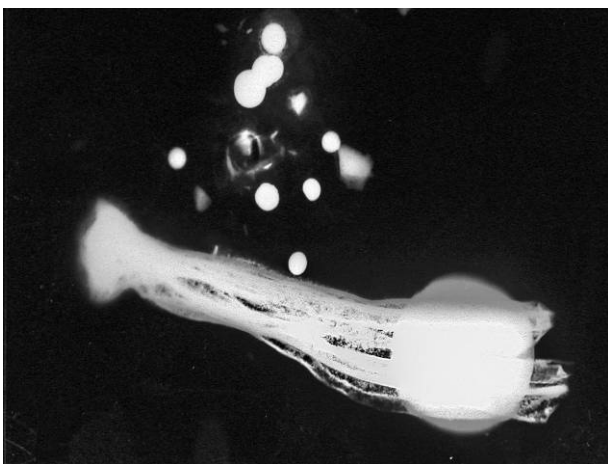
**A carpenter's gouge (04-11-06)**



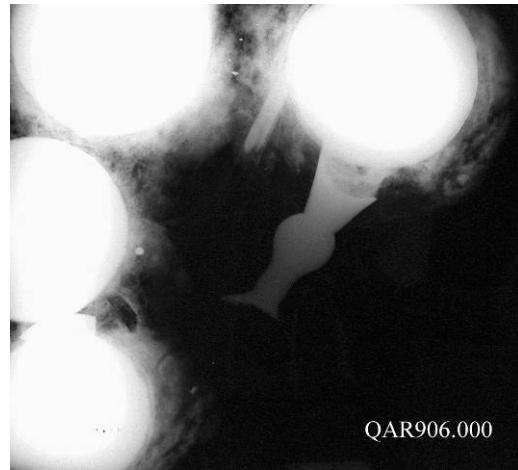
**One of two gunlocks is revealed (04-11-06)**



**Set of decorative cufflinks (04-11-06)**



**Tweezers lying atop a coin weight (12-14-06)**



**Glass stemware with cannon balls (12-14-06)**

With the final x-ray session taking place on June 19, 2007 the project continued for three more months to allow cataloguing, analysis and storage of images shot during the entire project. The submission of this report signals the completion of NGEC Grant project #EC0259-05.