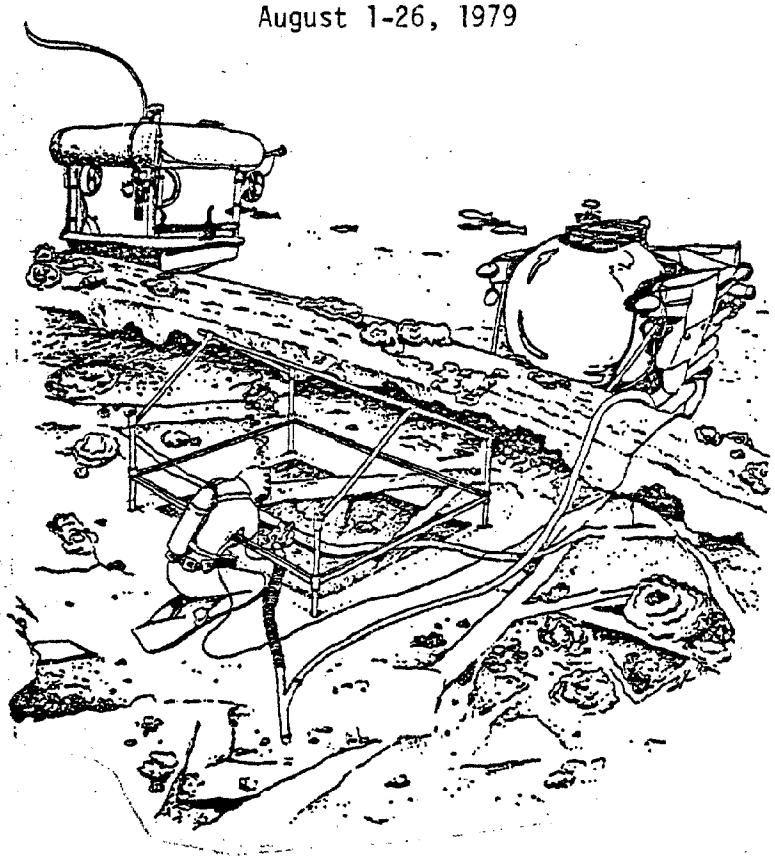
Preliminary Report:
Archeological and Engineering Expedition
Monitor Marine Sanctuary

August 1-26, 1979



By

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U.S. Department of Commerce
National Oceanic and Atmospheric Administration
Office of Coastal Zone Management

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This report represents the final Cruise Report for the 1979 underwater archeological and engineering expreditions at the Monitor Marine Sanctuary. The report is published by the National Oceanic and Atmospheric Administrtion to provided information to archeologist, historian, researchers, and others interested in the management and protection of the U.S.S MONITOR. We gratefully acknowledge the contributions of the following:

Gordon P. Watts, Jr.	Head Underwater Archeologist, North Carolina Division of Archives and History.
Roger W. Cook	Director of Operations, Harbor Branch Foundation, Inc.
Kenneth Morris	State Conservator, New York Division of Historic Preservation, Peebles Island Collection Care Center.

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INTRODUCTION

During 1978 a series of historical, engineering, and oceanographic research contracts were initiated by the North Carolina Division of Archives and History to identify and collect information related to the U.S.S. Monitor. In addition to evaluating the present knowledge of the site, the studies were designed to identify additional material that would be essential in the adoption of a management plan that outlines research and management goals and objectives for the Monitor Marine Sanctuary. Based on these studies and research needs developed in the course of preparing the management plan, a second and more ambitious investigation of the Monitor was planned for the summer of 1979.

With firm commitment from Harbor Branch Foundation for support vessels, planning for the research project began in earnest in the early months of 1979. While the participation of the National Oceanic and Atmospheric Administration precluded the necessity for a research permit, the operation manual was circulated for review, comment, and approval through the same channels established for proposals.

From August 1 to August 26, 1979 the National Oceanic and Atmospheric Administration in cooperation with the Harbor Branch Foundation and the State of North Carolina undertook an extensive investigation of the Marine Sanctuary. Archeological objectives included establishing four permanent datum points on the north side of the wreck, designing and conducting a test excavation in the forward portion of the confines of the wreck within the hull, and a general examination and assessment of the site by means of diver observations

and hand held photography. Historical and engineering objectives included additional photographic and video documentation under and inside the wreck, an analysis of the attitude of the ship, and the recovery of wood samples to provide insight into the condition of the vessel. Details of the proposed work were spelled out in an extensive operations manual prepared by the National Oceanic and Atmospheric Administration, with assistance from the Harbor Branch Foundation, Inc. and the North Carolina Division of Archives and History.

Data generated by the research project afforded valuable insight into the archeological and engineering problems presented by this and other deep water archeological sites and significantly broadened the knowledge upon which managment decisions will be made in the future.

ARCHEOLOGICAL REPORT

By
Gordon Watts

In preparation for the on-site research at the Monitor Marine Sanctuary, archaeologists Gordon Watts and Richard Lawrence from the Underwater Archaeology Branch of the North Carolina Division of Archives and History and John Broadwater from the Virginia Historic Landmarks Commission underwent an extensive series of physical examinations at the Duke University Hyperbaric Medical Center and completed a ten-day training and equipment familiarization program carried out off West End, Grand Bahama Island, and at the Harbor Branch facilities in Linkport, Florida. The training proved to be of benefit as it provided the first insight into the

nature and limitations of the delivery and support systems that were to be used in the operations. In addition, training in the submersible provided the archaeologists with enough experience with the delivery and life support systems to permit them to concentrate on accomplishing the project objectives.

The project began on August 1, 1979, with a non-lockout reconnaissance dive to examine the site. In the afternoon the first lockout was made to locate a positioning harness for the baseline datum stations and jet the first casing into the sediment adjacent to the amidships bulkhead. An electrically powered water pump mounted on the bow of the submersible provided water pressure sufficient to jet the first casing into a position identified by the harness. A leveling collar attached to the 3 inch casing provided the control necessary to assure a vertical orientation. While the first and second datum casings were easily jetted into the sediment to a depth of 5 feet, the remaining two located forward of the amidships bulkhead proved to be more difficult. At a depth of 3 feet an extremely compact stratum of sediment frustrated efforts to sink casings to the desired 5-foot depth. During the course of the project both of the forward casings were dislodged by the current. While it is possible that the stratum represents a natural formation, the discharge of calcareous material and black oxide from the casing indicated that the layer may be related to material associated with the Monitor (Figure 1).

Following placement of the baseline casings, a reconnaissance of the forward portions of the wreck was carried out to determine the most appropriate location for the test excavation. A location on the port bow

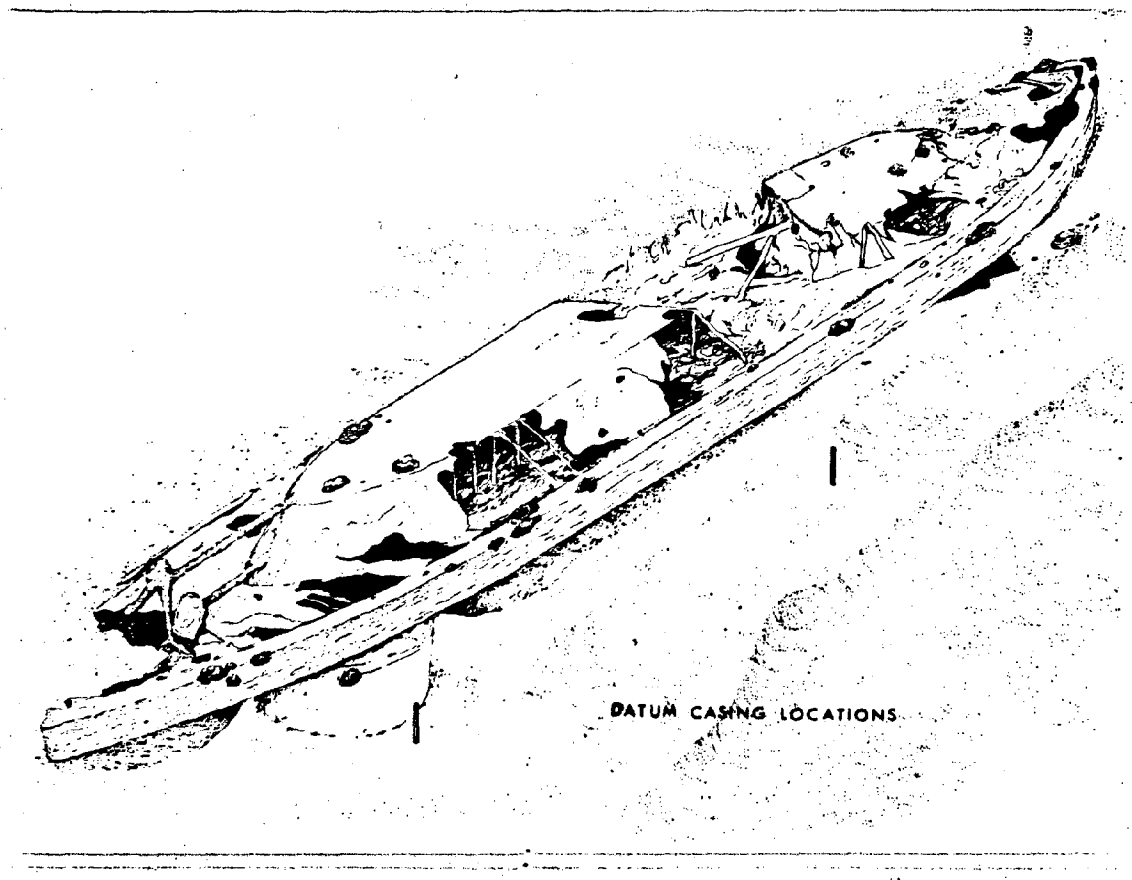

Figure 1.

inboard of the armor belt had been tentatively selected based upon an analysis of photographs taken from the ALCOA SEAPROBE in 1974 and the JOHNSON SEAL-LINK II in 1977. The reconnaissance confirmed the first choice as the best locations for an excavation (Figure 2). With the exception of a small area adjacent to the armor belt in the vicinity of the pilot house, most of the wreck is covered by large fragments of plating from the lower hull.

After the site for the test excavation was established, an aluminium grid frame constrtucted by personnel from North Carolina State University was set up to control the work, (Figure 3). Once positioned and leveled, the frame provided a horizontal plane for measurement and photography during the excavation. Although the frame was designed for stereo photogrammetry, camera problems precluded stereo mapping; therefore traditional X-Y-Z coordinate mapping was utilized. Photography was employed to enhance mapping detail.

Initially the test excavation was carried out in a 5-foot square within the control frame (Figure 4). Because of the presence of structural material, it was necessary to reduce the scope of the excavation to a 2- by 5-foot rectangle in the southern end of the original excavation. In spite of additional structural material, it was possible to carry the excavation to deck timber and planking. Removal of the sediment was accomplished with the assistance of a hydraulic induction dredge powered by an electric pump mounted on the submersible. Discharge from the 3-inch dredge was routed over the armor belt to assist in keeping the water in the excavation area as free of sediment as possible (Figure 5).

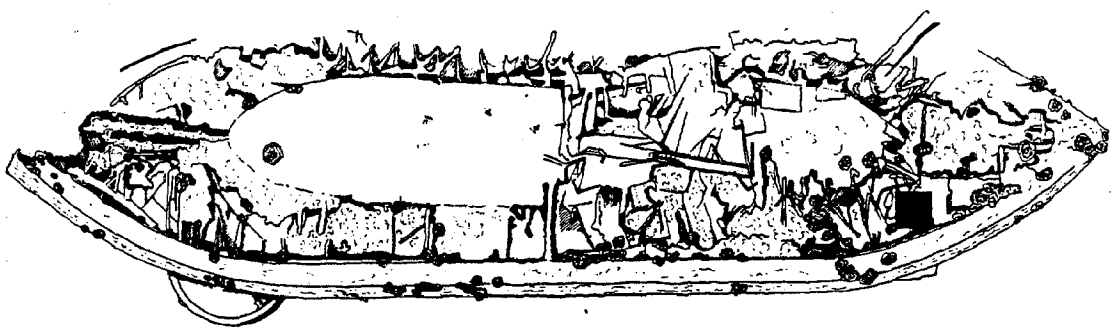

Figure 2.

Figure 3. Test excavation activity was documented by a closed circuit television camera mounted on the grid frame at the beginning of each lockout.

Figure 4. Photomosaic documentation of material exposed after excavation of the first 6 inches of sediment.

Analysis of the strata exposed during the test excavation revealed that the upper layer of the sediment was composed of sand and coarse shell hash. Modern debris found at the lowest level of this stratum confirmed that there has been considerable activity in the upper layer of sediment. At a depth of approximately 14 inches a transitional zone was identified. It consisted of larger shell and barnacle remains interspersed in sandy mud. With the exception of calcareous encrustations that had formed around the deteriorating remains of the vessel, no material associated with the ship was found in this stratum. Below this the sediment was composed of a very fine mud and silt that had come out of suspension in the water column. This stratum covered the structural remains of the deck and contained extensive fragments of non-structural wood bulkheads, cabinetry, and storage containers. All of the artifacts recovered during the project associated with the MONITOR, with the exception of a glass "U.S.S. NAVY/MUSTARD" bottle found on the surface of the grid area, were found in this layer. Immediately above the deck beams and planks, fragments of foul weather apparel, book binding, a ceramic soap dish, English walnuts, and a brass thimble were recovered. Although teredo damage to the wood was found to be extensive, the surfaces of deck beams and planks were crisp and undamaged, preserving all of the surface detail (Figure 6).

As the test excavation neared completion, attention was directed to the examination and documentation of the remainder of the vessel in a attempt to collect data that would answer historical, engineering, and conservation questions. Exploration and photographs began in that portion of the ship forward of the amidships bulkhead and proceeded aft into the galley and

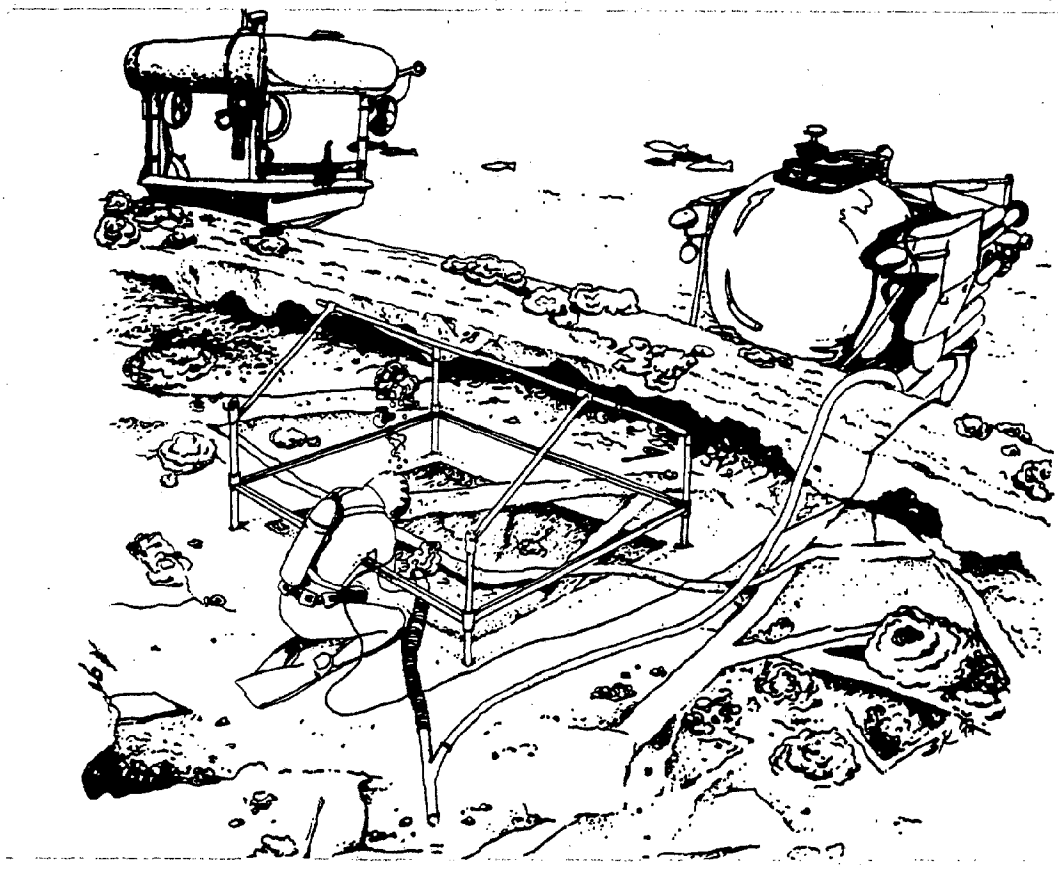

Figure 5. Artist's rendering illustrating the test excavation in progress.

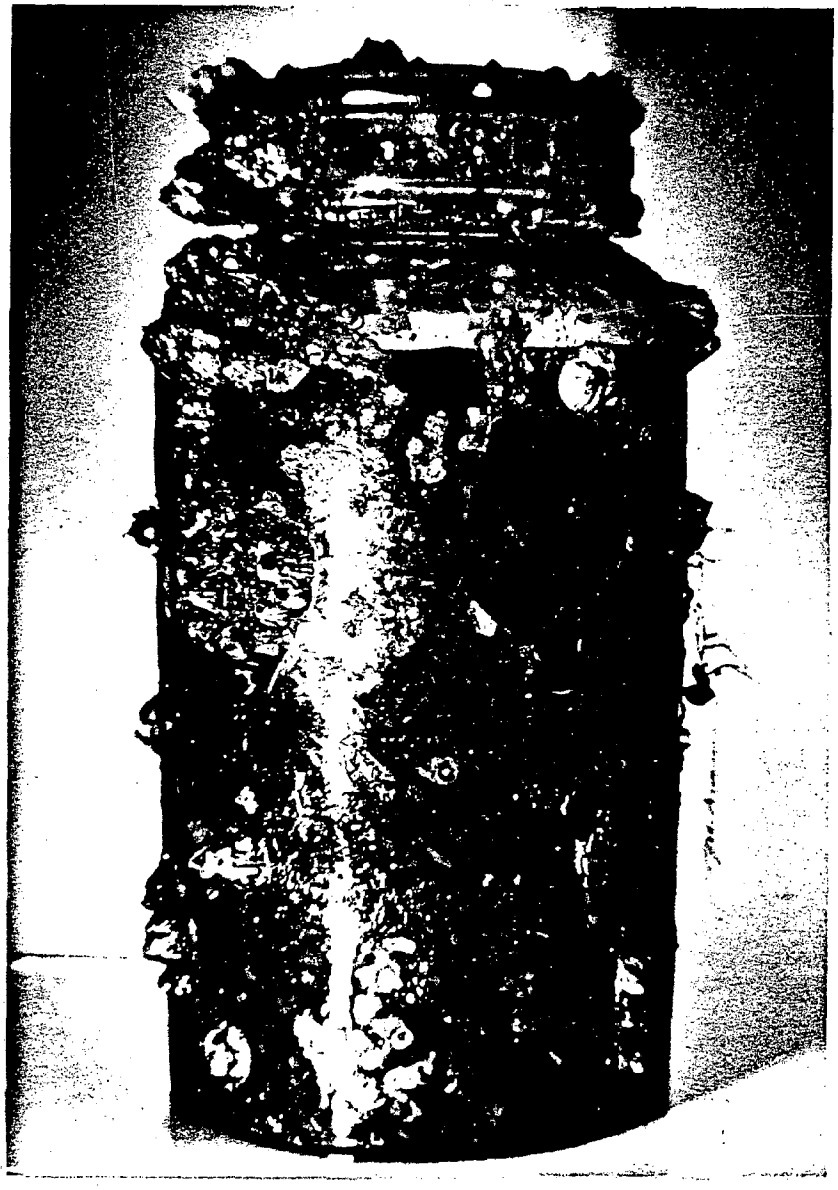

Figure 6. "Hartwell's Glass Jar Patented 1858, Guaranteed Air-Tight" was found to contain exceptionally well preserved relish that still retained its aroma.

engineering space where the lower hull structure had not collapsed. In addition to assessing damage to the structure of the vessel, the investigation generated information that provided insight into a broad spectrum of historical, architectural, engineering, and construction details. Observations were noted by the investigators and both 35mm and low light level television cameras were used to document the wreck. Along with inspecting the interior of the hull, examination included inspecting the bottomdeck under the wreck and the condition of the turret.

While assessment of the data collected during the project is continuing some conclusions have been made. Perhaps the most important concern is the wreck as an archaeological site. While the test excavation revealed the high energy nature of the upper stratum of bottom sediment, it also revealed that the zone containing material and artifacts contemporary with the vessel is preserved undisturbed. Material recovered from this layer indicates that the preservation of material at the site is quite good. The survival of extensive amounts of organic material confirms this . In spite of the possibility that the shipwreck was depth charged, the archaeological record is excellent and continued systematic scientific investigation of the site will produce a wealth of knowledge about both the MONITOR and its crew. While the preservation of material from a salt water environment is always complex, the MONITOR site presents no insurmountable problems short of preservation of the vessel structure itself. Although extensive additional information will certainly be required , it is obvious that preservation and restoration of the entire ship for display is unrealistic.

A detailed examination of the structure of the MONITOR indicated that both the iron and wood portions of the vessel have been extensively damaged during sinking, by possible depth charging, and by deterioration. Although a substantial portion of the vessel still supports itself, it is extremely unlikely that there is sufficient strength to resist even the most modest additional stress. The deck, thought to be intact except for damage at the stern, was found to have collapsed and ruptured in three additional locations, spilling the contents of the vessel onto the bottom. The examination of the deck revealed that numerous plates have indeed separated from the supporting wood deck timber and beams. At each location, exposed structural wood exhibited extensive teredo and pholed damage. The amidships bulkhead, the only structural interior bulkhead, was found to have collapsed entirely on the port side and deteriorated extensively on the starboard side. Investigations in the stern confirmed that the survival of portions of the lower hull aft of the amidships bulkhead was due to the presence of ship's machinery and boilers. Establishing that the list to starboardis approximatley 20 degrees also confirmed that both the lower hull aft and deck/armor belt structures have suffered considerable lateral and longitudinal distortion. The turret, because of its exceptionally heavy construction, exhibited dents probably associated with the engagement with the CSS VIRGINIA, in addition to teredo, pholad, and cellular damage to the wood flooring. Access to the interior of the structure was not possible and probing of the wood floor produced no indication of the condition of material inside (Figure 7). In examining the problem of conducting even limited archaeological investigations at depths requiring sophisticated breathing gasses and

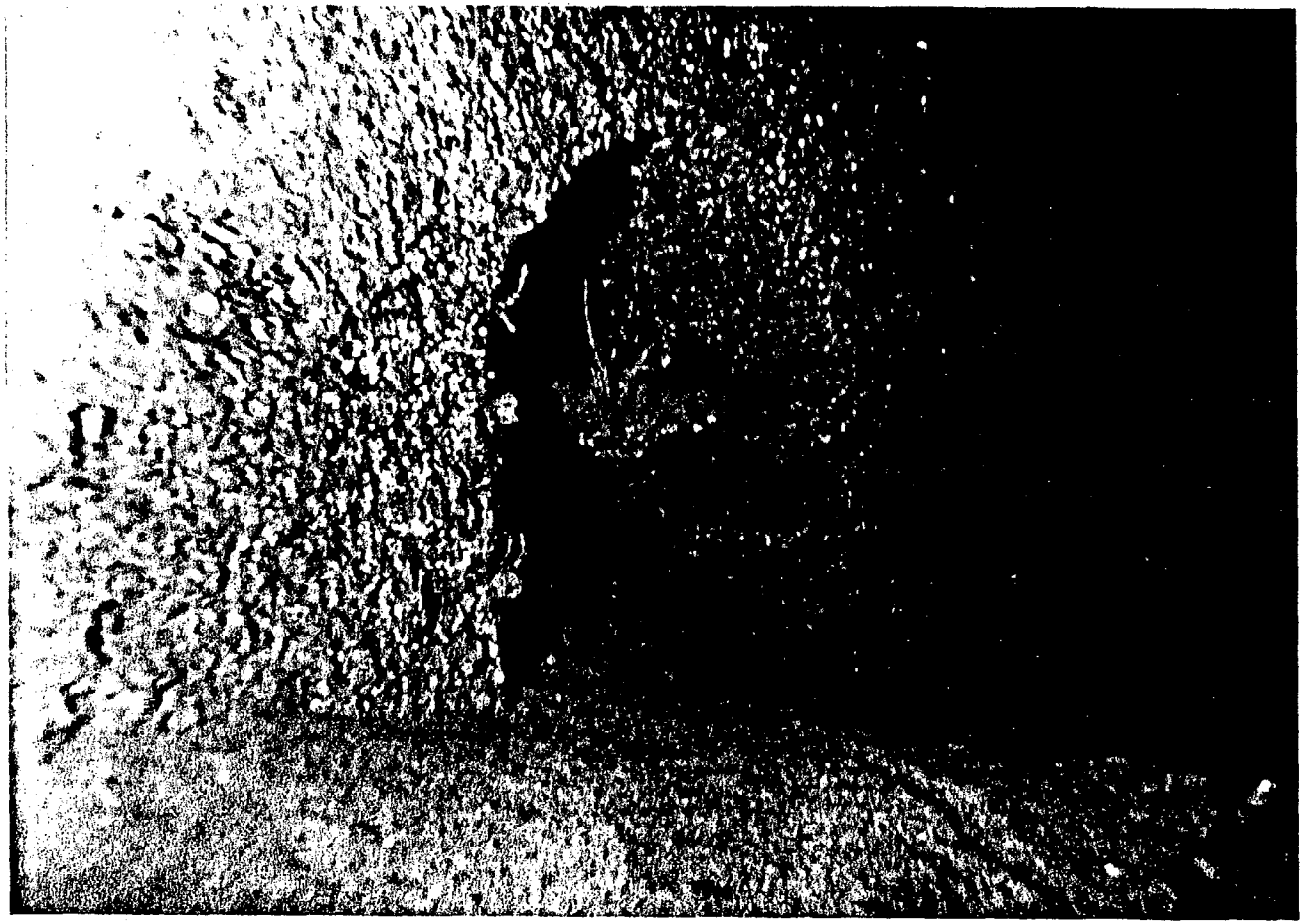

Figure 7. Gun ports were found to be closed by protective pendulums although original wood coverings which were employed to make the opening water tight had deteriorated completely.

delivery systems, it is obvious that saturation mode operations represent a distinct advantage. Every hour on the site required approximately four and one half hours of decompression in the chamber aboard the support ship. This schedule automatically limited daily on-site operations to a maximum of 2 hours. While the lengthy decompression schedule provided an abundance of time for evaluating and assessing each dive, the schedule became taxing both mentally and physically for the divers after the first two weeks (Figure 8).

Working in water temperature ranging from 18 to 26 degrees Celcius in conventional wetsuits made an endurance contest out of a number of the lockout dives. With compression significantly reducing thermal properties of the wetsuits and the heat loss associated with the helium oxygen breathing mixture archaeological priorities deteriorated rapidly toward the end of each lockout. Working slowly and meticulously in the test excavation also seemed to accelerate the effects of the cold. Toward the end of the excavation it was noted that lockout times could be extended by utilizing the last of each dive for exploration and photography of the wreck. Exertion associated with vigorous movement appeared to generate some reserve body heat.

Communications, always a problem at depth, were additionally complicated by the breathing mixture. In spite of the voice unscrambler, extensive communications proved impossible, eliminating the possibility of recording observations verbally. While some voices can be understood with regularity, others proved quite impossible and defied translation by the diver himself. While the submersible delivery and support system provided adequate

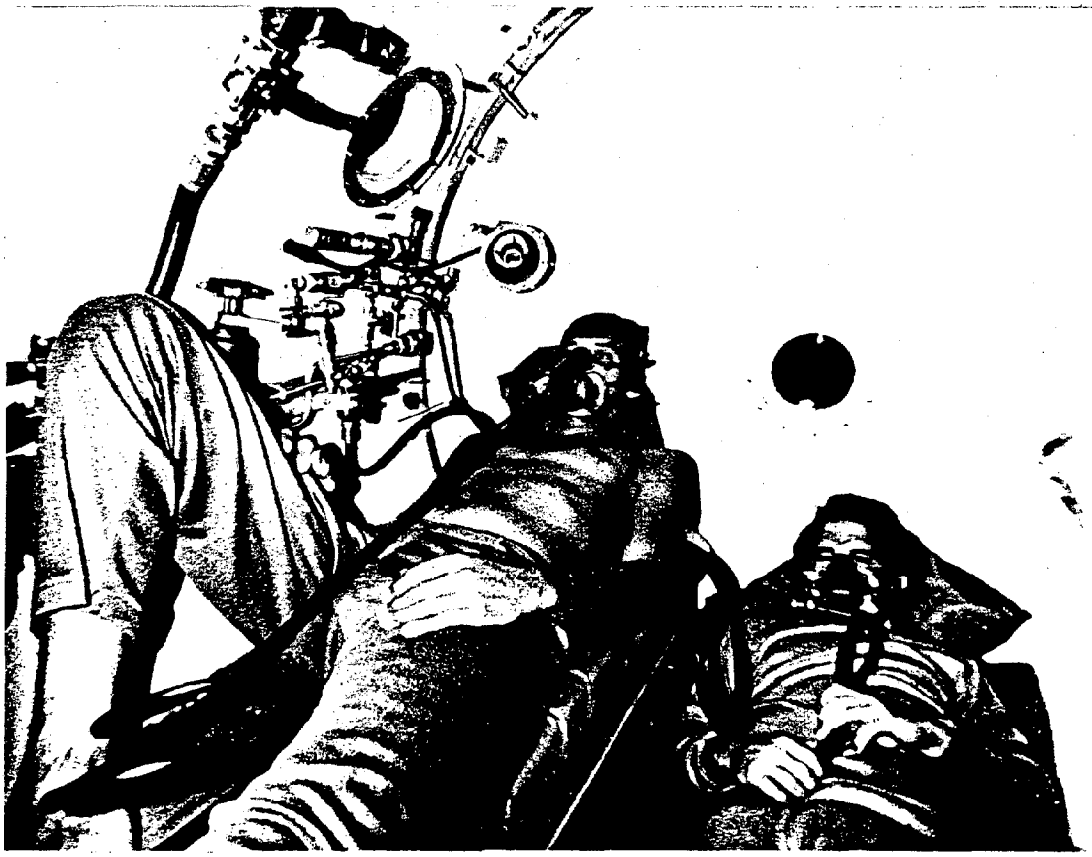

Figure 8. Decompression schedules provided ample opportunity to record and reflect on the activities of each lockout.

support for the limited objectives of a test excavation, extensive work at that depth will require a different system. Additional power for tools would have to be available before extensive excavations could be carried out with efficiency.

In spite of the problems and limitations, the project provided archaeologists with an opportunity to bring state of the art technology to bear on the problems of managing and investigating deep water sites. In addition to generating a wealth of site specific information about the MONITOR, the work has served to illustrate the possibilities for advancing archaeological investigations into ocean depths.

AT-SEA OPERATIONS

By Roger W. Cook

JOHNSON-SEA-LINK I (J-S-L-I) conducted a total of 49 dives from August 1 to August 26, 1979. Of these, 36 were lock-out dives. A lock-out dive is defined as pressurizing the aft compartment of the submersible to ambined sea pressure (utilizing either high pressure air or mixed gas) so that a diver may exit and perform work.

At 0800 on the morning of July 31, 1979, R/V JOHNSON, transporting J-S-L I, departed Link Port in Fort Pierce, Florida. She arrived in the Monitor Marine Sanctuary at 2400 Tuesday, July 31. The total distance of 560 nautical miles was covered in 40 hours, with an average speed of 14 knots. Sea conditions during the transit were 2 - 4 feet.

The U.S.S. MONITOR was immediately located and the launching of J-S-L I for an observation and reconnaissance dive officially began the mission on Wednesday morning, August 1. The observer in the pilot's sphere was North Carolina underwater archaeologist, Gordon Watts. During this first dive, we confirmed that the MONITOR looked basically the same as during our 1977 mission. It was clear of any debris or nets and the planned test excavation site appeared to be in a good location. On the following four dives a baseline was placed along the entire length of the vessel on the north side and four permanent datum control points were jetted into the ocean bottom. The baseline consisted of a 1/8" stainless steel cable that was drawn tight and anchored to the bottom at each end of the wreck.

Markers on the cable allowed the accurate placement and positioning and placement of the four datum points. The datum points were 3 inch pipes measuring 10 feet in length. They were jetted into the bottom at (50 feet) intervals with a submersible-mounted electric pump. The pump supplied water pressure though a hose to a lock-out diver who guided the datum points into the bottom, using a leveling device to keep them vertical. The two datum points to the east were quickly and easily jetted down. The two to the west hit hard bottom about 3 feet down and stopped. The datum points were established to assist in accurately locating, for reference purposes, the work and observations made on the site.

The remaining lock-out dives were mainly for excavation purposes. By using the electric pump on the submersible, with approximately 50 feet of induction hose, the lock-out diver was able to lift light sand and debris from the test excavation area. The excavation continued each day with a lock-out dive in the morning and afternoon. An observation dive was usually scheduled mid-day between the two lock-out dives. With a decompression period of 24 hours between dives (end of decompression to start of pressurization), it was mandatory to have three two-man teams working in rotation to complete two lock-out dives each day. For each lock-out dive, consisting of sixty minutes bottom time at a working depth of 230 feet, 4.3 hours of decompression were required.

The current was usually from the southwest at about one knot; therefore, the R/V JOHNSON would launch J-S-L I slightly north of the

wreck, and the sub would touch down on the bottom about 150 to 200 yards north of the MONITOR. A beacon mounted on the submersible and another previously set at the wreck would visually display on a television screen position of both the MONITOR and submersible on the bridge of R/V JOHNSON. J-S-L I would approach the wreck using sonar until visual contact was made. The submersible was always positioned so the pilot and decompression controller in the pilot's sphere could see the diver in the water. The diver also took a low light T.V. camera from its mounting in front of the submersible and attached it to a tripod at the work site. The camera then looked directly onto the excavation area and allowed the pilot and decompression controller to observe and videotape the excavation process.

An umbilical, connecting the diver to the submersible, consisted of a hose for the breathing gases and a cable for communications. Only one diver would exit J-S-L I, while the other remained inside to monitor systems and act as a stand-by diver. By situating the submersible amidships of the wreck, the lock-out diver had enough umbilical to swim along the entire wreck.

Approximately 1000 cubic feet of gas was consumed during each lock-out dive. The breathing gas was 12% oxygen and 88% helium. Approximately 15,000 cubic feet of gas was carried onboard R/V JOHNSON. Because of this limitation, it was necessary to leave the Monitor Sanctuary once a week of resupply with heluim and oxygen in Morehead City, North Carolina, where additional reserves were kept.

The weather conditions at the site were much better than we had aniticipated. During the entire month, only two days were lost because the seas were too rough to safely launch and recover J-S-L I. Visibility ranged from zero to 150 feet with the average about 20 to 30 feet. During one particular dive, J-S-L I settled into complete darkness. At 220 feet, it was absolutely black with a current on the bottom of .1 knot from the southwest. The dives on the previous day, however, were of average visibility. We terminated operations that day and proceeded to Morehead City to replenish our gas supplies. When we returned two days later, the visibility was 100 feet and the following day, 150 feet. It was evident that during our absence, a very strong current had swept through the area (in excess of 1.5 knots). Our camera tripod was lying on its side, the two datum points to the west were uprooted and lying free to the north, and there was a large scour mark on the bottom where the current had raced around the bow. These same conditions appeared once during our 1977 mission. At that time, the pilot had reported a current on the bottom of 1.5 knots with zero visibility. Bottom temperatures at the site ranged from 18°C to 26°C with an average of 19° - 21°C. It is apparent that environmental conditions can change rapidly at the site.

A lock-out submersible proved to be a very effective tool for this type of work. A high degree of mobility was required to cover the entire wreck and this was easily achieved. The submersible was used to deploy divers as well as videotape the divers' work and the wreck and obtain 35mm still photography of specific areas.

CONSERVATION

By
Kenneth Morris

Both during and following the August 1979 expedition, the State of North Carolina moved to insure proper care was given the 108 artifacts recovered from the U.S.S. MONITOR. The services of the Division for Historic Preservation, New York State Office of Parks and Recreation were requested by North Carolina. Mr. Morris, a conservator for the New York Division for Historic Preservation, was responsible for examining the artifacts and recommending the best stabilization treatment for each. All artifacts were tagged, photographed and examined before being packed in stabilizing medium. All this conservation field work was accomplished at the temporary laboratory established in Hatteras, North Carolina. At the conclusion of the field project the artifacts were transferred to Ft. Fisher, North Carolina, headquarters for the North Carolina Underwater Archeology Branch. An inventory of the artifacts can be found in Appendix 1.

Mr. Morris continues to supervise the preservation both in Ft. Fisher and in the New York State Division for Historic Preservation's conservation laboratory at Peebles Islands, Waterford, New York. The transfer of artifacts to New York was deemed appropriate because the treatment capabilities available at Peebles Island (necessary for the conservation procedures) were not yet available at the Ft. Fisher facility. Additionally, New York was able to provide the constant supervision that certain unique artifacts required due to a more rigorous treatment which is described in the memorandum from Kenneth Morris to Gordon Watts, found in Appendix 2.

The artifacts have been classified into three broad categories: organic, iron and non-ferrous inorganic artifacts. Those artifacts located in Ft. Fisher are monitored regularly and are either undergoing very slow, easy to control processes or are simply being held stable awaiting further treatment. The present disposition of the unstabilized artifacts is as follows:

(1) Glass artifacts are stored in salt water. Gradually the salt water is being exchanged for water with a lower chloride content;

(2) Large iron artifacts are undergoing electrolytic reduction to remove the chlorides from the metal;

(3) Concretions, small iron pieces, and other metals (including copper alloys) are being immersed in distilled water which is heated to 90°F. This water is also changed at set intervals so that the chloride content will be reduced;

(4) Wood and the remainder of artifacts are being kept wet. The water in the "wood tank" is changed frequently to retard the growth of mold or fungus; and

Ceramic artifacts were put through a desalination process similar that of the glass artifacts, and treatment has been completed for the ceramics artifacts.

The conservation procedures at Ft. Fisher are on or ahead of schedule and the estimated completion date for the majority of the artifacts is June 1980. The artifacts sent to Peebles Island, Yew York have completed their conservation treatments, except one wood panelling fragment, catalogue .063.

On May 21, 1980 an exhibit on the U.S.S. MONITOR opened at the U.S. Naval Memorial Museum to celebrate the primier of NOAA's film, "Down to the MONITOR". All the artifacts from Peebles Island, except the one wood fragment were sent to the Naval Museum in May and the following artifacts were sent to the Naval Museum from Ft. Fisher: two pieces from a brass lamp base, two pieces of a porcelain soap dish, and a fragment of a large ironstone plate. These artifacts are on loan to the Naval Museum for exhibition and curation.

SUMMARY

On August 26, 1979, the project was concluded, and all objectives were completed.

On September 27, 1979 a meeting was held in Raleigh, North Carolina to review the expedition and discuss the accomplishments. Present at the meeting were Mr. Roger Cook, Dr. Larry E. Tise, Mr. Brent Glass, Mr. Gordon Watts, Mr. Richard Lawrence and Ms. Dina Hill, Mr. Kenneth Morris, CAPT Ernest Peterkin, (Ret.), and LT Ted Lillestolen, NOAA Corps.

At the conclusion of that meeting a statement was prepared which included tentative conclusions, findings and recommendations from the August 1979 Expedition. They are as follows:

I. Conclusions:

1. All the primary objectives of the expedition were accomplished within the 28-day period of the expedition.

2. A variety of artifacts and samples were recovered from the site and from the excavation that was conducted. These objects will be used to test the effectiveness of appropriate conservation techniques. The conclusions reached will be used as treatment guidelines for the spectrum of similar materials that will be found throughout the site in the course of any further excavation.

3. The broad range of data, photographs, and videotapes that was collected and recorded is currently available for in-depth analysis of the wreck site.

II. Findings:

1. The Monitor is extensively disturbed by natural and non-natural causes. For example, the exposed areas of the ship's bottom plating and inner support framing are severely deteriorated and parts of the wreck itself are scattered over a broad area.

2. The portions of the wreck covered by sediment are in better shape than exposed portions.

3. The hulk is exposed to changing temperatures and strong, variable currents that alternately cover and expose parts of the wreck.

4. Excavation is complicated by the considerable disarray of the wreck's structural members.

5. The remains of the U.S.S MONITOR cannot be raised intact by traditional salvage methods.

6. Recovery of artifacts must be well planned due to the variety of materials present, their varied state of preservation, and the cost of conservation.

7. In terms of the five phases of the Monitor Marine Sanctuary Management Plan, the selection of the most appropriate option for the ultimate disposition of the site cannot be made at this time.

III Recommendations:

1. That an engineering study and evaluation of the site be prepared from the available photographs, video tapes, and divers' reports indicating what portions of the ship are present or absent, relatively intact or scattered, and within the wreck or scattered over a broad area;

2. Based on the recorded data and the artifacts recovered, that conservation methodologies, techniques, and anticipated costs be prepared for conserving various portions of the wreck;

3. That additional archeological excavations be conducted in those areas of the wreck designated in the Monitor Marine Sanctuary Management Plan; and

4. That alternative delivery and support systems be explored for placing archeologists, engineers, and other professionals on the site to conduct extended investigations.

Appendix 1
Artifact Inventory

Glass, Ceramics

001	Intact wine bottle, dark green, no markings. 11" high.
002	Intact bottle, light green; "MUSTARD" and "US NAVY" on opposite sides. 6" high.
007	Bottle, light green; broken; "PEPPER" and "US NAVY" on opposite sides. 6" high.
039	Cathedral pickle bottle, light green; top broken; no markings. 9 1/2" high, 3" wide at the front, 2" wide at the sides.
041	Base fragment of square bottle, dark brown; possibly Plantation Bitters; molded design on sides; no markings. 3" square.
044	Two pieces of possibly three-piece soap dish, porcelain, white; no markings. One piece has holes for straining water; second piece, which fits under the first, is solid. Strainer 3 3/4" X 4 13/16"; base 3 3/16" X 4 5/8".
*079	Intact bottle, light green; "MUSTARD" and "US NAVY" on opposite sides; cork in place. 6" high.
103	Intact bottle, light green; "MUSTARD" and "US NAVY" on opposite sides. 6" high.
104	Intact bottle, light green; "MUSTARD" and "US NAVY" on opposite sides. 6" high.
105	Intact bottle, light green; "MUSTARD" and "US NAVY" on opposite sides. 6" high.
106	Storage jar with seal and lid, light green; no markings on jar; "PATENTED OCT. 19, 1858" on top of lid; "HARTELL'S GLASS AIR-TIGHT COVER" around sides of lid; top of lid decorated with 17 raised pointed beads of glass, broken. Jar 8 1/4" high, 4" in diameter at the base; lid 1" high, 3 1/2" in diameter.
107	Fragment of large plate, ironstone, white; no markings,
108	Base of square bottle, light green; no markings. 2 1/2" square.

* Removed to Collections Care Center, Peebles Island, New York.

Metal, Non-ferrous

011	Brass ring, possibly grommet. 1 3/4" in diameter.
*043	Brass lamp base; constructed of three pieces; lead balls and leather seal in bottom section; decorative motif around first section. Overall height 4", 5" in diameter at base.

* Bottom section removed to Collections Care Center, Peebles Island, New York.

Metal, Ferrous

004	Four unidentified concretions
038	Unidentified concretion
077	Unidentified concretion
078	Unidentified concretion
086	Unidentified concretion
089	Unidentified concretion
093	Unidentified concretion
098	Unidentified concretion
099	Unidentified concretion
101	Unidentified concretion
102	Unidentified concretion

Miscellaneous

003	Piece of decorative plastic, modern.
010	English walnut, infact; walnut fragments.
*014	Leather, portion of book binding.
042	Lens from Edgerton camera
*048	Rubber hose, 30 1/2"
*097	Piece of rubberized fabric
101	Round metal cap with perforations.

Wood

005	Wood fragment with brass hinge attached. Hinge 3 1/2" X 2 1/2"; 1 wood screw, 1 1/4" long.
006	Rectangular wooden block, 3 1/2" X 3/4" X1/2"
040	Concreted wood fragment, 11 1/4" long.
*049	Wood fragment
*050	Wood fragment
051	Wood fragment, 14" long
052	Wooden louver, 11" X 1 3/4" X 1/4"
053	Wood fragment, 3 1/4" long.
054	Wood fragment, 7" long
055	Round wooden object, possibly bung, 1 1/2" in diameter.
056	Rectangular wooden block, 3" X 1 1/2" X 1/4"
057	Wood fragment, 2" long.
058	Wood fragment, 1 1/2" long.
059	Wood fragment, 4" long.
*060	Piece of tongue and groove panelling, joins with 062, 063, and 064.
*061	Piece of tongue and groove panelling, does not join with other four pieces.
*062	Piece of tongue and groove panelling.
*063	Piece of tongue and groove panelling.
*064	Piece of tongue and groove panelling.
065	Wood fragment, 3 3/4" long.
066	Wood fragment, 5 1/2" long.
067	Wood fragment, 5 1/2" long.
068	Wood fragment, 4 1/2" long
069	Wood fragment, 8 1/2" long.
070	Wood fragment, 8" long.
*071	Wood fragment
072	Wood fragment, 4 3/4" long.
073	Wood fragment, 5 1/2" long.
074	Wood fragment, 6" long.
075	Wood fragment, 2 1/2" long.
076	Wood fragment, 6" long.
080	Wood fragment, 5 3/4" long.
081	Wood fragment, 4 1/2" long.
082	Wood fragment, 3 1/2" long.
083	Wood fragment, 3 1/2" long.
084	Wood fragment, 4 1/4" long.
085	Wood fragment, 3 1/2" long.
087	Wood fragment, 16" X 1"
088	Wood fragment, 7 1/2" long.

*090	Wood fragment
091	Wood fragment, 5" long.
092	Wood fragment, 3" long.
094	Wood fragment, 1 1/2" X 1/2" X 3/4"
095	Wood fragment, 2 3/4" long.
096	Wood fragment, 3 3/4" long.

* Removed to Collections Care Center, Peebles Island, New York.

DIVISION FOR HISTORIC PRESERVATION Peebles Island Waterford, New York 12188
HISTORIC SITES BUREAU 518-237-8643
COLLECTIONS CARE CENTER 518-237-8000
Orin Lehman, Commissioner

M E M O R A N D U M

October 23, 1979

TO: Gordon Watts

FROM: Kenneth Morris

RE: Treatment of Monitor Artifacts Now at Peebles Island

This memorandum is the final treatment proposal. It was accepted in its present form from the draft memo of September 26, 1979.

In order to stabilize the artifacts from the field work you ompleted during August 1979, I propose the following:

Pickle Relish

The two major factors in stabilizing this artifact are the exclusion of oxygen and light., In addition, any problems of microbe growth should be considered now and eliminated. The following procedure is recommended:

1. Remove a small (e.g. 10-50 cc) sample of the relish and store it at low temperature in the absence of light. I recommend a wide mouth bottle as the storage container. (This type of bottle is listed in the VWR Scientific Inc. Catalog '78 on page 196. Type 16180-003 or an appropriate size should do nicely.)

2. The remaining relish should be treated as follows: Remove the relish into a battery jar (Type 13740-350, see VWR Catalog '78, page 89, or an appropriate size); using flexible plastic hose bubble nitrogen through the entire mass; add a biocide such as a 2% solution of phenol (see Lawson, E., "In Between: The Care of Artifacts from the Seabed to the Conservation Laboratory and Some Reasons Why it is Necessary," Beneath the Waters of Time, 9th ICUA, San Antonio, Texas, p. 89-90)

to the relish; and then cover the mass (2-3 inches thick) with molten wax (such as multiwax W-445 by Witco Chemical). The wax will solidify and seal the relish inside the container. By doing this, air and bacteria will find it difficult to foul the relish. Even though refrigeration will not be essential, this container should also be kept cool and in the dark. Inside a standard refrigerator would be a handy place to keep both relish samples cool and out of the light. However, other alternatives can be explored at your discretion.

"Lantern Base"

This artifact is seemingly held together, at least in part, by corrosion. The leather centerpiece is held to the lead shot by corrosion and the shot itself is frozen in place by corrosion. Any tampering with this delicate balance is undesirable. The following treatment is recommended:

Soak the object in several changes of ethyl alcohol for four weeks. After this dehydration step hot (ca 80°F) Peg 1500 (with a biocide added) should be applied to the leather until it appears saturated. The artifact should then be kept in a sealed container and the ambient relative humidity lowered gradually from 100% to match that of the Peebles Island Conservation Laboratory. At that point some consolidant might be added to the lead shot, and the copper should be treated to retard corrosion with an alcoholic solution of Benzotriazole.

Leather Book Binding

This artifact should be stabilized without being cleaned because the leather is severely deteriorated. The procedure in this case should be as follows:

Immerse the object in a 10% aqueous solution of Peg 1500 for 6 weeks. Freeze, then freeze-dry the artifact. Immediately following the drying process the object should have a 20% solution of Lanolin/Benzine brushed on its "front" side. The tear now visible in the leather should be closed and supported from the rear with a piece of thin paper (in a manner similar to mending a torn work of art on paper). Any cleaning or stain removal necessary should be done at this point.

This artifact should be stored in a custom designed case made from Plexiglas (preferably UF-3 type). The case will serve several purposes. It will guard against unnecessary handling of the artifact; it will retard degradation from light; and it can and should be designed to retard degradation from atmospheric contaminants.

Mustard Bottle

The radiograph of this artifact shows three internal areas. First there is the area visible from the outside, at the mouth of the bottle. This red-brown mass is apparently an accretion rather than original material. Farther into the bottle, two inches from the mouth, is the cork. It seems to be in good condition but is swollen so that removal will not be a simple process. Behind the cork and continuing to the bottom of the vessel is a homogenous mass that may be the bottle's original contents. Although it is not possible to examine the third constituent without excavation, the demarcations of sections indicates that it may be original and, therefore, worth preserving as an artifact. The proposed treatment is as follows:

1. Excavate the first internal section up to the cork. Save the contents as follows: freeze ½ in tact for further study. Freeze-dry the remainder.

2. Without removing the cork, excavate the third area. Again save ½ of the material by freezing it and freeze-dry the remainder.

3. Desalinate the glass. Using the procedure outlined for glass in my memo of September 24, 1979, remove the salt contaminants from the glass. (At the discretion of the conservator the desalination process may be carried out at a swifter pace.)

4. Immerse the cork in a 5% aqueous solution of Peg 1500 for 1 week; 7.5% for 1 week; 10% for 1 week. Then add 0.5% Ethulose, allow to soak for 1 week, and then dry both the cork and bottle slowly (in a manner identical to that followed for the Lantern Base).

Rubber Hose and Rubberized Fabric

In order to stabilize these pieces and keep them stable, storage may be nearly as important as remedial treatment. The remedial treatment of these particular artifacts is still under investigation. However, impregnation with a silicone or other oil and storage in custom made glass vessels will doubtless be important parts of the treatment procedure. When the treatment is decided, a separate proposal will be submitted. (I wish to nte with great thanks the research efforts of Ms. Victoria Jensen, Conservator at Parks Canada's Conservation Lab in Ottawa. Ms. Jensen has consented to test possible treatments for these two materials on rubber artifacts in her lab. For this cooperative effort I am very grateful.)

Wood

With the exception of piece 071, the wood should be stabilized as follows:

1. Reduce iron staining with a wash of 2% HCl.

2. Wash out HCl with fresh tap water.

3. Immerse the wood in a 5% aqueous solution of Peg 400 for two weeks.

4. Raise the Peg 1% per week for 10 weeks. Allow the artifacts to remain in the final solution for two weeks.

5. Freeze then freeze-dry the artifacts.

6. Apply a brush coating of 5% shellac in Ethyl alcohol.

Piece 071, because of its very tight grain and natural density, should be stabilized as follows:

1. Dehydrate through several Ethyl alcohol baths.

2. Brush on hot (ca 80°F) Peg 4000 until saturation.

3. Slow dry (as was done for the Lantern Base).

4. Apply a brush coating of 5% shellac in Ethyl alcohol.

Naturally, if in my judgment, any treatment outlined here is not showing itself to be in the best interest of the artifact, I will modify or stop the treatment. I will notify you in writing of such an occurrence.

The equipment, supplies necessary for these treatments, and further treatment information will be sent to you in subsequent memos. If you have any questions about methods or materials, please contact me by phone or in writing. I will not begin any treatments without prior written approval from you.

Kenneth Morris

KM:kc

Conservator

cc: A. W. Smith
J. Gold
P. Battaglino
J. Thatcher
L. Tise