THE PILAR PROJECT

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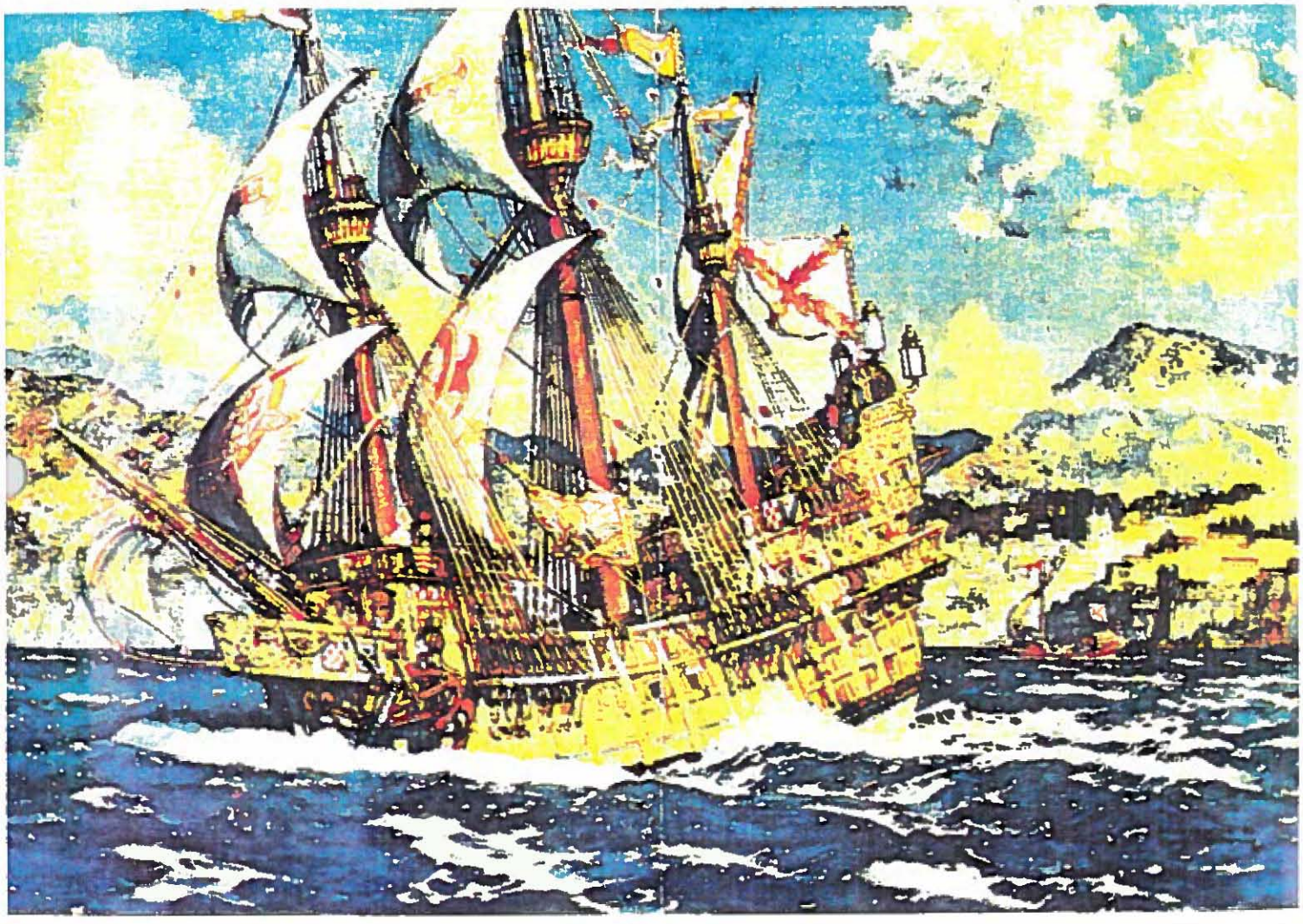

RESEARCH DESIGN

August 1991

MARINE ARCHAEOLOGY
of a Spanish Manila Galleon

Nuestra Senora del Pilar de Saragosa y Santiago

OPERATIONAL PLAN
AND
RESEARCH DESIGN
1991 - 1994

Submitted by :

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10 August 1991.

PREFACE

This operational plan deals with the underwater excavation of the wreck of the Spanish Manila Galleon, Nuestra Senora del Pilar de Saragosa y Santiago, lost on the Pacific island of Guam in 1690. This is being done under a negotiated legal agreement between a private corporation and the Guam Government.

It must be emphasized that the success of this undersea project hinges on the close cooperation of Government agencies, educators and the private sector. The marine archaeological operations detailed in this research design have been carefully planned ; but while research indicates that the main site lies in shallow water within a high energy zone wept by surf and currents, some wreck material may have slipped beyond the safe limit of SCUBA operations. In such a case state-of-the-art deepwater technology (such as ROVs, Side Scan Sonar etc) will be used to locate and map shipwreck remains, if practicable, to complete the overall archaeological report.

The Pilar project is a grand adventure in nautical archaeology, maritime history and undersea technology on a scale which has not been seen before in the Pacific. It involves multiple marine archaeology problems and concepts, extensive research in world archives, recovery of unique historical artifacts and promotion of public awareness of one of the great eras of Pacific history when royal galleons linked Asia and Spain via Mexico across 8,000 miles of open ocean.

"The most resourceful states financing underwater archaeology will be those that are entrepreneurial.....
They will be the States that allow sport divers to become valid colleagues with the archaeologists ; that encourage public education ; that let underwater archaeology serve as the vehicle for teaching technology, geography and history ; and that allow the end product of the excavations and conservations to be exhibited in such a way that attracts visitors who will spend their tourist dollars in those communities. .."

" Historic shipwreck management is a fertile area for exploring policies that encourage the use of both public and private financial resources to bring our underwater heritage out of the exclusive circles of special interest groups and into the public realm."

Historic Shipwrecks :
Issues in Management
(1988 : 58)
National Trust for Historic Preservation
and Partners for Livable Places.

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EXECUTIVE SUMMARY

This archaeological proposal presents an operational plan and research design to conduct scientific underwater excavations on the shipwreck remains of a Spanish Manila Galleon, Nuestra Senora del Pilar de Saragossa y Santiago which sank off the south coast of Guam on 2 June, 1690. The proposal outlines an innovative blending of private sector funding and archaeological expertise with state-of-the-art marine archaeological methodology organized and directed by professional archaeologists and an interdisciplinary staff of consultants and museum specialists.

The Pilar Project Ltd (PP) has initiated a phased program which provides three year funding for archaeological data recovery, site interpretation, artifact preservation, archival research and publications typical of what is expected by the academic community. PP believes that an orderly, systematic operation conducted by widely recognized, experienced marine archaeologists is the only way to insure that professional goals are fully achieved in the recovery of archaeological data along with artifacts in the most efficient way possible.

The archaeological operations are outlined in a phased approach :

Phase I A (Site survey and Identification) ;

Phase I B (Archaeological mapping and Test Excavation) ;

Phase II (Excavation and Artifact Stabilization) .

High tech procedures using electronic mapping devices, ROV video and CAD/Cam computerized data recording systems have been integrated into all phases of the project. The most advanced scientific technology is being used to locate, and record, in-situ physical remains of the shipwreck and its contents prior to artifact recovery. Plans have been made to develop museum exhibits and a teaching program in Guam in association with the University of Guam and the Micronesian Area Research Centre (MARC). Interim reports and a final comprehensive publication will be prepared detailing the site methodology and archaeological findings placing the Pilar cultural assemblage in a world-wide historical perspective. These goals will be met with private capital at no expense to the Guamanian Government and people.

The Project Director and Director of Archaeology will work, in close cooperation with the State Historic Preservation Officer and the Territory Archaeologist in all matters concerning the archaeological aspects of the project. PP has a contractual agreement with the Department of Parks and Recreation in the Guam Government to provide 25% of the artifacts recovered in the operations. A representative sample of all artifacts will be chosen from the total assemblage for research, educational and exhibition purposes.

The Pilar project represents a merging of entrepreneural enterprise with a professional archaeological approach. This partnership between the private sector, the academic community and the Guam Government is being offered as a joint cooperative undertaking which could serve as a model program in other parts of the world.

The overall research objective of the three year Pilar project is to compile archaeological data from the physical remains of the ship and its contents so that anthropological questions concerning human behavior can be considered. Some basic questions involving European adaptation and maritime technology within the Manila Galleon cultural context may be relevant to a cross-cultural comparative study focusing on similar questions relative to indigenous seafaring traditions of pre-contact

times.

The archaeological investigations of the Pilar site will commence a year after the 300th anniversary of its sinking. It is very fitting that this first scientific examination of a westward sailing Manila Galleon be undertaken in Guam as part of the Christopher Columbus Quincentennial Celebrations (1492-1992) already underway in the United States and many other countries of the world.

Special acknowledgements are due to Dr. Hiro Kurashina, Dr. Dirk Anthony Ballendorf, Professor Marjorie G. Driver, and their colleagues at the Department of Anthropology, Micronesia Area Research Center, (MARC), University of Guam, for assistance in providing background information and support for this project.

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1.0 INTRODUCTION.

1.1 BACKGROUND

For eight years, the principals of this project have been involved in research, negotiation and litigation for rights to conduct a marine archaeological project on the 1690 wreck of a Spanish Manila Galleon, lost off the island of Guam. In January 1989, judgement of the US Ninth Circuit court confirmed ownership of the wreck in the Guam Government, thereby validating a previous legal agreement with the corporation for a project on the site. Court actions in the Guam District Court and the Ninth Circuit had placed arrangements to start the project in limbo for two years. A Motion for Reconsideration challenging this judgement, was lodged with the Ninth Circuit Court. It, however, was disallowed on September 22, 1989, and , after, allowing the statutory period for a possible US Supreme Court suit, which did not occur, all legal action now has been resolved in favor of the Guam Government and this project. Major preparations can now commence after eight years of research and negotiations.

The Galleon was carrying a considerable cargo of silver four and eight reale coins when she was lost. The Guam Government's permit provides for distribution of proceeds from the project on the basis of 25 % to the Government and 75 % to the permit holder. To meet local legal requirements, the Principals set up a Corporation under Guam Law, Davey Jones Archaeology Ltd (DJA). It is this corporate body which has been awarded the permit by the Government. It is now operating under the name "The Pilar Project Ltd " (PP), which the organization's principals felt was a more appropriate title for the whole venture.

1.2 CORPORATION CONTROL

Davey Jones Archaeology, the permit holder, is in the legal control of John Bent and Anthony O'Grady who have been the project's financial backers for the past eight years. Legal arrangements for this have been completed on Guam. This situation now allows for funding negotiations with investor corporations to proceed at an appropriate level and gives legal right to any agreements reached in such negotiations .

1.3 PERMIT AREA STATUS

The Court decision has secured Davey Jones Archaeology's rights in the permit area which is a three statute mile radius around a given point on Cocos Island Reef.

1.4 EXPERT STAFF CONTRACTS

Contracts have been made with expert staff to help direct the project. R. Duncan Mathewson III has been appointed as Director of Archaeology and the Principal Investigator (PI) of the project. His involvement, as one of the World's authorities on Spanish maritime culture, will ensure archaeological integrity of the project. His presence will also facilitate the involvement of the Universities of Hawaii and Guam in an exchange of knowledge and to promote future training opportunities in marine archaeology at each University.

Magnetometer and side-scan sonar survey services have been arranged to carry out an initial electronic survey of the whole site. This will be done with state of the art computer-enhanced survey equipment. Use of these instruments will enable metallic concentrations buried in the sea-bed and surface features to be detected, plotted and mapped for future archeological investigations.

Both arrangements required the approval of the Guam Department Of Parks And Recreation. A meeting with their representatives and our Archaeologists was held recently and the approvals have been processed.

1.5 ACTIVITIES ON GUAM

A Project Office has been established in Agana with administrative and operational facilities and a staff of four persons including the Project Director, John Bent and local Liaison Officer, Jim Cruz who has been part of the project from its inception. This is located on the second floor of the R.I. Calvo Building on West Soledad Avenue. A range of project equipment has been assembled, including diving gear, underwater scooters, surface supply breathing systems, metal detectors, magnetometers, a Global Positioning System and hand held radios. A preliminary magnetometer survey of the reef and its general area is about to start and this is expected to identify precise areas for further investigation. Two power boats are available to support scanning and diving operations.

1.6 RESEARCH.

For the last eight years a large effort has been made to research the wreck of the Pilar and much valuable information has been collected from Spain, the Philippines and Mexico. Information on other ships in the Pacific has been gathered in the process, enhancing the corporation's knowledge of this interesting and valuable era. The group has amassed a library of documentation during this time and intends to establish this in a computerised data base. A research manager is available to consolidate the information and who has extensive experience with computer systems design and programming. The corporation intends to develop its research capability and information holding to the point where it will become a major reference source for anyone researching the era. The holding and building of detailed information will be a major asset for the group in identifying other sites and areas of the world. The corporation has contracted expert research staff in the various archives who can undertake this work. Detailed research is of critical importance to the project's credibility and progress. It will be necessary to commit substantial funds and time to a detailed ongoing research program. While PP's part-time effort has established the facts, circumstances and location of the shipwreck in 1690, it is necessary now to trace the ship's full sea-going career, the lives of key personalities associated with her, political and social effects of her loss to build a full cultural picture of the disaster.

1.7 LEGAL BATTLE FOR PERMIT RIGHTS

The Government of Guam granted DJA an exclusive permit in May 1987. This was done under Heritage Protection Legislation enacted by Guam in 1982. At the time DJA wished to lodge a protective claim under US Admiralty Salvage Law but was advised by the Guam Government that this body of law was subordinate to the Heritage Legislation thus making any such claim unnecessary.

In June 1987, Robert F. Marx, a US Treasure Hunter, lodged an Admiralty Claim on the wreck alleging that he had found the main wrecksite. His claim, however, was centered on the exact co-ordinates of DJA's permit area. Marx had applied to the Guam Government for a licence to the Pilar wreck after DJA, and the Government sent him a letter rejecting his application and stating that DJA had been given a permit. This letter quoted our co-ordinates. The effect of Marx's claim, if upheld, would have given him 100% ownership of the site and its contents.

Immediately, the Government of Guam moved to dismiss the Admiralty Claim in the District Court. This was based on Guam's Heritage Legislation and the Government of Guam's sovereign immunity status. The District Court upheld Marx's claim and stated that it was valid on the basis that US Federal Law was predominant over territorial law including any sovereign immunity extended to Guam by Congress. The Guam Government appealed this decision to the US Ninth Circuit Court Of Appeals in San Francisco.

At the same time, the Government advised DJA that this appeal could take up to two years and recommended that DJA challenge Marx's claim in the District Court to prevent Marx from carrying out any work on the site. This case was instituted by DJA with the support of the Government. After many legal procedures, the case went to trial in July 1988 in the District Court of Guam. Marx's considerable experience in shipwreck litigation, compared to DJA's, showed during the trial. After hearings lasting eight weeks, the District Court found in Marx's favor.

In the meantime, Government of Guam had succeeded in getting the Ninth Circuit Appeal scheduled earlier than expected. The case, between the Government and Marx, was heard by a panel of three judges in September 1988. DJA, through its US and Guam attorneys, provided considerable assistance to the case. In January 1989, the Ninth Circuit Court handed down its decision finding in the Government of Guam's favor. The conclusion of the Court's judgement states the following and is reproduced below :

CONCLUSION

Guam had standing to bring its motion to dismiss in the district court. Guam has sovereign immunity. Its motion to dismiss should have been granted; it had a colorable claim to the shipwrecks. The district court lacked jurisdiction to enter the default judgement as to the Vigie. Similarly, the court lacked the power to proceed to trial and judgement as to the Pilar. Both judgements should be vacated, and the entire case should be dismissed for lack of jurisdiction. Accordingly, the district

court's judgements are reversed, its order denying Guam's motion to dismiss is reversed, and this case is remanded to the district court with instructions to vacate the judgements and to dismiss the entire case for lack of jurisdiction.

REVERSED AND REMANDED

The effect of this judgement was to establish the Government of Guam's exclusive control on the wreck site with the concomitant right to select a permittee to recover the wreck. Soon after the judgement was handed down, Marx filed a Motion For Reconsideration requesting the Ninth Circuit Court to reconsider the matter. At the time the unanimous judgement of the three Appeal Court Judges who heard the case was so strong, both in its wording and its legal basis, that Guam's Attorney-General and DJA's own legal advisers firmly believed Marx would abandon any further attempts to win access to the wreck in the courts. In the Motion, Marx attempted to raise a new argument that the Pilar's wreck did not rest within the territorial waters of Guam and that, therefore, Guam Government did not have a valid claim to the wreck. On this argument he petitioned for the Ninth Circuit Court to rehear the case. His petition was referred to all 29 judges on the Ninth Circuit panel. On September 22, 1989, the following judgement was filed with the Court :

Before : Wisdom, Boochever and Thompson, Circuit Judges

In his petition for rehearing, Robert Marx ("Marx") argues that Guam may not have a colorable claim to the shipwreck Nuestra Senora del Pilar because the wreck may not lie in Guam's territorial waters. Marx has waived his right to raise this issue at this late date. He failed to raise the issue in the district court in his opposition to Guam's motion to dismiss. See Bolker v. Commissioner, 760 F. 2d 1039, 1042 (9th Cir. 1985). Marx further failed to raise the issue on his briefs on appeal. "Courts of Appeal will ordinarily not consider for the first time on rehearing issues not presented by the parties in their briefs on appeal." Escobar Ruiz v. Immigration and NaturalizationServ., 813 F. 2d 283, 285-86 (9th Cir. 1987), aff'd, 838 F. 2d 1363 (9th Cir. 1988) (en banc). Therefore, we decline to consider the argument.

Marx's motion to strike the documentation accompanying Guam's response to the petition for rehearing is granted. Marx's motion for leave to file an affidavit and associated documents in opposition to Guam's response to the petition is denied.

The petition for rehearing is denied.

The full court has been advised of the suggestion for rehearing en banc, and no judge of the court has voted for en banc rehearing. Accordingly, the suggestion for rehearing en banc is rejected.

1.8 POST TRIAL/APPEAL LEGAL ACTIVITIES.

To eliminate any further legal challenge and to establish the Government's preeminent position with respect to the Pilar wreck site as well as DJA's paramount position as the Government's permittee, the Government sought and received a Quit Claim deed to the wreck site from the Federal Government in February 1991. The effect of this deed was to unquestionably establish title to the wreck site in the Government of Guam and also to make the DJA permit no longer challengeable by anybody other than the Government of Guam.

1.9 RECOVERED ARTIFACTS.

The first artifacts in the area of the site were recovered under a territorial archaeological permit by DJA in June 1986. Six Chinese porcelain sherds of possible Ming Dynasty date first indicated the presence of submerged cultural material off Cocos Reef. A year later 63 additional objects were recovered by Robert F. Marx in his effort to locate and identify the Pilar so that it might be arrested under Federal Admiralty Law. In July, 1987, a further 142 artifacts were recovered by Marx following his arrest of the site in late June. In December of the same year, six more artifacts were recovered by DJA, while they reasserted their right to explore the site under an exclusive contract with the Guam Territorial Archaeologist and the Department of Parks and Recreation. Following the start of a long drawn out jurisdictional struggle over control of the submerged area in the neighborhood of the site, 73 more objects were recovered by Marx in February, 1988.

The total assemblage presented to the court as representing evidence of the sinking and break-up of the Pilar consists of 290 objects. (See Appendix C for inventory list of material filed with the court). This assemblage consists of a collection of artifacts with little or no precise provenience data. Chinese porcelain, unglazed red earthenware, ballast rock, spikes, non-descriptive iron "fasteners", Spanish olive-jar necks, a lead sounding weight and obvious modern intrusive matter generally characterizes the assemblage.

The uncertainties and the lack of precise archaeological records concerning the recovery of this material makes it difficult to arrive at any definitive conclusions concerning the area of the reef where the Pilar first struck. However, the dating of some of the artifacts (principally the Chinese porcelain and Spanish olive-jars) clearly suggests the presence of a mid to late 17th century Spanish vessel somewhere in the near vicinity of Cocos Reef.

2.0 THE PILAR SITE.

2.1 FACTS OF THE WRECK

The galleon is known to have gone aground in calm weather about 8.00pm in the evening of June, 2, 1690. During an attempt to warp her off the reef, she was severely damaged in the surf and sank to the level of her main deck. Accounts then state that her boats, from her consort galleon ,Santo Nino, and local boats from the town of Meriso were used to evacuate the passengers and crew with their personal belongings to Meriso beach on Guam. During the transfer some baggage and religious objects were lost. Our research indicates very little was salvaged from her during the next few days. During the time the wreck was awash, her rigging was dismantled and some of the timbers from her sterncastle were also taken. The timber was used to build other boats. None of the contemporary sources state that any major amounts of material were salvaged from the cargo of coins. As she was lost on the side of the island which is exposed to typhoons, it is most probable that her wrecked hull was destroyed by the first typhoon of the season (approx. September 1690). Total destruction of the wreck would have most certainly been completed by the severe typhoon which struck Guam in 1693. Sources state that she sank in about 25-30 feet of water and came to rest about 100 feet from the surfline of the reef. The reef she struck drops off to deep water very quickly. One hundred yards out from the surf line the bottom is about 70 to 90 feet deep and drops down to 120 to 140 feet two hundred yards out.

2.2 SPANISH SALVAGE TECHNIQUES.

Spanish salvage techniques in the seventeenth century relied on the use of breath holding divers. The practical depth limit for this type of salvage is about 40 feet providing the divers do not have to negotiate obstacles. Where galleons had run aground, the Spanish salvors would set fire to the wreck and burn it to the waterline. This would have the effect of opening up the hull and compartments so that free divers could enter the holds and cabins to tie ropes onto objects. The cut-away galleon photograph on page 7 gives a good assessment of problems free divers would have penetrating an intact hull. Once ropes were tied on, objects would then be hauled into salvage boats at the surface. Sometimes salvage crews would lower a diving bell or upturned barrel to the bottom for divers to get a breath of air to extend their time underwater. (See *Peterson*, 1975).

Accounts of salvage operations indicate that ships (ie Nuestra Senora de Atocha)which had sunk in deep water (up to 50 feet) or had remained intact and so could not be burnt to the waterline (like the Pilar's wreck) were very difficult, if not impossible, to work. More often than not, only items on deck or in the top of the holds could be reached. Operations like this usually extracted a heavy death toll on the divers.

As an example of the difficulties of working with these techniques, the case of salvage of the galleon Santa Margarita, lost in 1622 off Key West in Florida can be considered. The ship was sunk in a hurricane while on route with the Tierra Firme Flota to Spain (*Lyon*, 1976). In 1626 a royal salvage contract was awarded to Francisco Nunez Melian in Havana and he succeeded in locating the wreck with a team of Indian divers. By this time hurricanes had broken the wreck up and it was scattered across a sandy bottom. Between 1626 and 1630 Melian's salvage crew worked the site which was located in 30 feet of water. In that four year period they raised 380 silver ingots, more than 100 copper ingots, 12 pieces of bronze artillery and 67,000 silver coins. Spanish authorities at the time regarded this as a successful operation highlighted by the use of a diving bell with underwater viewing ports which was a considerable technical advance then. It is worth noting, though, that it took a considerable effort over a four year period to raise 67,000 silver coins. This is a good measure of any effort needed in that era to salvage a cargo containing in excess of 1,000,000 coins.

2.3 SPANISH SALVAGE ATTEMPTS ON PILAR.

Documentation unearthed by PP's contract researcher includes eye-witness statements that only the ship's cannon and anchors were salvaged during the first four days after the wreck. A further report written a year later confirms this fact, states that nothing could be salvaged from the sunken hold and also reports that 5000 pesos in Mexican silver coins was the only amount of silver recovered from the registered cargo. The documentation found on the incident so far amounts to more than 600 written pages of reports and accounts, yet the facts above are the only statements of salvage in this body of material.

2.4 CIRCUMSTANTIAL EVIDENCE.

Corruption was an endemic problem in the Spanish Empire for all of its history. This characteristic, however, has provided "between the lines" evidence that the Pilar was not salvaged between 1690 and 1694. It was a Royal policy that the financial affairs of all high officials be investigated by a Viceroy's audit team if such a person died in office. This was part of attempts to stem corruption at high levels in the Empire's administration. On August 16 1694, the Governor of Guam, Don Damien de Esplana who was appointed to the post in 1690, died suddenly and his affairs were investigated by a Royal Audit team sent by the Viceroy. The team found that all the Governor's wealth could be accounted for from three sources :

a. his annual salary of 4000 pesos,
b. he had put an increase on the price of provisions sold to Manila-bound galleons and the amount was skimmed off into his own funds,
c. he had embezzled 56066 pesos from a Royal Subsidy of 108991 pesos sent to fund the operations of Guam's military garrison.

PP believes that this is good circumstantial evidence to support the lack of salvage of the Pilar wreck. With a king's ransom, literally, on the doorstep of Governor Esplana, it is reasonable to expect that some of the money, if salvaged during this time, would have found its way to his pockets. We have established that Governor Esplana was carried to Guam as a passenger on the Santo Nino which the Pilar was accompanying before she was wrecked. As a high ranking official, it is reasonable to expect that he would have had some knowledge of what the little fleet was carrying to Manila. Given his involvement in the salvage of the Pilar's cannon and anchors after her wreck, he was certainly aware of the potential of the site. The absence of any trace of the Pilar's money during this snap audit of Governor Esplana's financial affairs on this remote island points to an obvious conclusion that in 1694 the silver was still on the seabed. Also there are no accounts in the local traditions of Guam about the ship being recovered. Yet, had this occurred, it should have left a lasting impression in the local history of this isolated island.

2.5 RESEARCH BY OTHERS.

Accounts of the Pilar wreck are contained in John S. Potter's book - "The Treasure Hunter's Guide" (1960). It, too , states that the ship was not salvaged in colonial times. Potter spent many years researching valuable ship losses in Archives located in America and Europe. He was not able to locate any documents indicating the Pilar had been salvaged.

2.6 LEGAL PRESSURE APPLIED TO DJA.

For eighteen months from June 1987 to January 1989, DJA was challenged in Court by Robert F. Marx over rights to recover the wreck. Marx and his associates had done considerable private research on the Nuestra Senora del Pilar before applying to

the Government of Guam for permits to the site. When these were granted to DJA, Marx and his investors spent more than $1.2 million challenging our permits in Court. That they were prepared to spent funds on this scale in an attempt to secure the site confirms that their own research has come to the same conclusion as Potter's and DJA's - the Pilar's archaeological remains are still to be found on Cocos Island Reef.

2.7 NATURE OF THE CARGO.

Although the ship's manifest has not yet been located, documentation clearly suggests that the Pilar was carrying a considerable amount of treasure cargo including as many as 1,500,000 coins amounting to some 47 tons in weight. Spanish custom at the time was to pack the money in chests of about 2,500-3000 coins weighing some 160 pounds each. This method of lading would give the Pilar a cargo of about 600 chests of coins. In size each coin is about the same as an Australian 50 cent piece or a US silver dollar. This large, heavy mass of cargo would have been loaded low in the galleon to keep it stable for sailing. Spanish accounts indicate that it was a common practice to treat these large and heavy consignments of coins as ballast confirming that they would be packed at the bottom of the holds. A statement from the vessel's commander clearly indicates that nothing could be salvaged from the ship's hold or lockers at the time she sank.

2.8 PILAR HISTORICAL DOCUMENTATION.

In the Spring of 1691, the Chief Judge of the Audencia de Manila, presided at a Residencia (major legal enquiry) into the loss at Guam on 2 June, 1690 of the Manila galleon Nuestra Senora del Pilar de Saragosa y Santiago. The conduct of her commanding Admiral at the time, Don Juan de Echevarria (and his officers), was the subject of this official investigation. A copy of the enquiry (including an earlier inquiry held three days after the shipwreck), with accompanying letters and papers, was then sent to Spain.

The more than six hundred page report of the Residencia was eventually filed away in Section Escribania de Camera de Justicia (writings in the Court of Justice), legajo # 414C, at the Archivo General de Indias in Seville, Spain, where it lay unnoticed for almost three centuries.

In the Spring of 1989, a DJA researcher discovered the file and immediately ordered it microfilmed in its entirety. Preliminary review of these documents, along with others found elsewhere, allows for the following analysis :

In the Spring of 1688, the Philippine built patache Nuestra Senora del Pilar de Saragosa y Santiago sailed from Manila for Acapulco on her maiden voyage in company with the 800 ton Manila Galeon Santo Christo de Burgos. After spending more than a year in Acapulco, the Pilar left for Manila early in 1690 with a crew of 120, plus 43 soldiers, 22 Franciscan missionaries, and other passengers. She sailed in consort with the large galeon Santo Nino, which was carrying the annual Situado (Crown shipment of supplies and silver) of 250,000 pesos to Manila. The Santo Nino, under the command of General Garay Cochea, was serving as Capitana (Command vessel). The Pilar, under the command of Admiral Juan de Echevarria, took on the role of Almiranta (Support vessel).

2.9 DOCUMENTED SUPPLIES.

General Garay Cochea, the owner of the Pilar, had offered her in the Royal service principally because this arrangement included an open ship's registry (Permission to load commercial cargo for private interests) in both Manila and Acapulco. Additionally, the Crown agreed to pay for round-trip voyage expenses and all necessary ship's equipment. Her Manila to Acapulco registro (Complete manifest) is detailed, and shows her principle eastbound cargo to be oriental silks. Also, there

are six extensive lists of her outfitting:

1. **SHIP'S TOOLS AND SUPPLIES** (7 pages, 76 listings)
   Examples:

   a) 7 sounding leads, total weight 4 arrobas
      (1 arroba = 25.37 pounds)
   b) 250 sailcloth needles
   c) 1 iron scale with 5 bronze balance weights
   d) 12 pair of handcuffs with chains
   e) 1 metal ship's bell

2. **MILITARY SUPPLIES** (1 page, 9 listings)
   Examples:

   a) 40 muskets (27 Viscayan, 8 Milinese, 5 Holandes)
   b) 20 arquebuses
   c) 25 pikes
   d) 36 large porcelain jars of gunpowder, total weight 50 arrobas

3. **RELIGIOUS EQUIPMENT** (3 pages, 23 listings)
   Examples:

   a) 1 Calix (Chalice) of silver embossed with gold
   b) 1 Chrismera (Set of holy oil decanters) of silver
   c) 2 bronze candlesticks
   d) 1 bronze bell

4. **MEDICINE CHEST** (3 pages, 47 listings)
   Examples:

   a) 2 pairs of scissors
   b) 2 arrobas of common turpentine
   c) 2 arrobas of balsam oil

5. **PROVISIONS** (4 pages, 20 listings)
   Examples:

   a) 40 large china crocks of salt pork
   b) 1 arroba of white Castellian wine in a
      china crock

6. **EASTWARD SAILING CREW'S LIST** (Totalling 91 men)

2.10 THE VOYAGE.

A Jesuit mission was established on Guam in the Marianas in 1668, and a Royal Governor and garrison troops first arrived in 1681 (*Haynes and Wuerch*, 1990). Thereafter, it became customary for the westward bound Manila Galleons to stop at Guam to deliver funds, supplies, and passengers (usually missionaries); and to re-provision the ships for the remainder of the long trip to Manila.

When approaching from the southeast, it was usually considered prudent to avoid the strong currents and coral reefs off Cocos Island, at the southwestern tip of Guam. This required an additional day or two sailing up the east coast and rounding the northern capes to find safe anchorage in one of the bays on the western side, near the settlement at Agana. Recent historical research has suggested that this was the route Magellan followed in 1521 after first sighting Guam. (*Rogers and Ballendorf*, 1989).

During the long Pacific crossing of 1690, both the Santo Niño and the Pilar became in dire need of fresh water. The degree of urgency was such that, when navigational fixes indicated they were nearing Guam on 28 May, the General ordered the smaller and faster Pilar to sail ahead and signal the Capitana with her cannon when land was sighted. It was also decided to save time by skirting Cocos Island to the west and anchoring in Umata (now Umatac) Bay, just six miles up the western side of Guam.

2.11 THE SHIPWRECK.

At dawn on 2 June, 1690, the Pilar's lookouts spied the southern coast of Guam through the morning haze, and the signal was given. During that day, she sailed back and forth between Guam's southeastern cape (Now Aga Point) and Cocos Island, awaiting the Capitana. Each time she tacked, Pilar apparently moved nearer shore. As dusk approached, she was running approximately west-southwest on her final leg, roughly parallel to Guam's south coast. The intention was to swing northward after clearing the reef that juts out about a third of a mile beyond the southwestern tip of Cocos.

Nearing Cocos, Pilar's pilot Pedro Vinales chose to ignore the two warnings given him by another officer regarding the potentially strong tidal flow around the upcoming point. However, while skies were clear and seas were calm, both low tide and sunset were rapidly approaching.

Then, when still well east of the intended pivot point, at the worst possible moment, the wind suddenly died. Almost immediately, she was caught in the grasp of the powerful current sweeping northward around Cocos. Vinales ordered her helm to port, but, with no wind, Pilar slid inexorably towards the reef. She slowly turned counter-clockwise, and her bow pointed into the current. As night fell and she drifted over the narrow shelf just seaward of the breaking waves at the reef's edge, the depth was measured at 5 1/2 brasas (1 brasa = 5 1/2 to 6 feet). Shortly thereafter, her stern entered the surf, and she grounded at a measured depth of 2 brasas.

Her ship's boat was promptly launched so that an anchor could be placed seaward. Boats from both the Capitana and from shore were also sent to her assistance. After waiting about an hour for the tide to rise and lines to be secured, a combination of hauling on the anchorline and rowing in the boats allowed her to gradually move off the reef. As she slid through the surf, Pilar's stern smashed down sharply three distinct times, tearing off a portion of her bottom and opening up her seams. She immediately filled up and sank, resting on her leeward side one ship's length seaward of the reef, on a sand bottom.

Nuestra Senora del Pilar de Saragoza y Santiago was lost, as a number of witnesses testify, "*...en un bajo de la punta de Isla de Cocos....*" (On a reef off the point of Cocos Island).

Lt. General Don Damian de Esplana, the newly re-appointed Governor of Guam, was a passenger aboard Santo Nino. The island's first military commander (1674-76) and later Governor (1683-88), he was there to again assume command over his former comrade-in-arms, Lt. Governor Captain Jose de Quiroga. In the 1660's, the two had been effective (some would say brutal and repressive.) in dealing with the ongoing native rebellion against Spanish religion and rule, which had begun in 1670. Eventually, following Esplana's death in office in 1694, Quiroga would crush the last rebel remnants in 1695 (*Hezel*, 1989).

2.12 SALVAGE EFFORTS.

At sunset on 2 June, 1690, when it was first recognized that Pilar was in trouble, both Esplana, in a longboat from the Santo Nino, and Quiroga, sailing from shore,

rushed to her side. Later, when she smashed against the edge of the reef and sank, they promptly organized and led the successful nighttime rescue of all aboard. But, because Pilar filled up so quickly, there was no time to save the items below decks.

The next day, General Garay Cochea asked Esplana to assist in the recovery of Pilar's silver, cannon, and anchors. Less than three days after the disaster, the General convened a short inquiry aboard the Santo Nino, at which the testimony of officers and sailors was recorded. Their statements indicate that they were already well on their way in recovering the cannon and anchors, but show their frustration in attempts to get into the cargo hold.

Pilar was newly built with Philippine hardwoods, well known for their incredible toughness (*Schurz*, 1939). The hulls of Manila Galleons were considered impenetrable, even in battle, when large cannonballs would just bounce off their sides. The resiliency and strength of the wood made it impossible for the salvors to get to the silver. Nevertheless, before he departed a few days thereafter, the General asked Esplana to continue the effort, however difficult. A year later, no one seemed surprised that he had failed. A total of only 5000 pesos in silver coin is reported as being salvaged during that year. Along with personal possessions and contraband left aboard in the confusion of that night, other components of her cargo reported to be hopelessly lost in her hold were cases of hats, cocoa, and soap.

There is no record, in the documents so far unearthed, of any further success in recovering Pilar's cargo in the following years. In any case, Pilar's hull lying in shallow water near the edge of a coral reef, would almost certainly have been destroyed and her contents buried under the sand in the major typhoon that struck the island in 1693 (*Carano and Sanchez*, 1964). Thereafter, surely all hope of recovery was abandoned.

The Governor was also handed another problem. The island's population had been devastated by a smallpox epidemic, which reached its peak in 1688 (*Carano and Sanchez*, 1964). Few sailors and passengers were willing to go ashore at all, let alone remain behind to await transport to Manila. Therefore, to make room on the already crowded Santo Nino for Pilar's survivors, the General left a group of convicts, originally destined for Manila, on the island. Three months later, in putting down a plot to overthrow their guards and take over, Esplana ordered twenty-three prisoners executed. Since there is no mention of convicts in the Pilar's documents, there is every reason to believe they had sailed from Acapulco aboard Santo Nino .

There are brief references in the documents to earlier shipwrecks. They show that Esplana was ordered to report on the effort to salvage cannon from the wreckage of another Manila Galleon, Nuestra Senora de Concepcion. She was lost in 1638 at Tinian, which had been "pacified" by Quiroga in 1684. Also, in describing his prior knowledge of the dangerous tidal currents around Cocos Island and its reefs, one officer refers to the "time of Leandro Cuello" when a ship was apparently lost in the same immediate area as Pilar under similar circumstances.

2.13 ARCHIVAL EVIDENCE.

An interpretation of the documents allows certain important questions to be addressed regarding Pilar :

1. WHAT WAS HER SIZE ?

While details of her construction and dimensions are not available, we do know:

a) She was built in the Philippines and was newly launched when she sailed

from Manila in 1688.

b) In addition to being called the "Almiranta" in 1690, shewas at various times referred to as the "patache", the "nao", and the "galeon".

c) She carried a crew of 91 eastward in 1688, and 120 westward in 1690.

d) While in port in Acapulco from late 1688 to early 1690, local authorities considered sending her out (apparently alone) to eliminate pirates then infesting the coast of Nueva Galicia.

Considering these facts, it can be deduced that Pilar was a minimum of 300 tons and a maximum of 500 tons, with somewhere between 20 and 40 guns. Using the following table (*Schurz*, 1939), her dimensions can be estimated within narrow limits.

Tonnage	Length of deck	Length of keel	Beam	Dept. of Hold	Number of Guns
1534½	174 feet	145 feet	49 feet	25 feet	80
1095	156 "	130 "	43 "	22 "	70
990½	140 "	126 "	42 "	21 "	60
488½	120 "	100 "	34 "	17 "	50
410½	112 "	73 "	31 "	15 "	40
303½	102 "	85 "	29 "	15 "	30
199½	88 "	73 "	25 "	13 "	20
144½	78 "	65 "	22 "	11 "	10

2. WHAT WAS PILAR CARRYING ?

Her registro (Detailed manifest) is thus far unavailable, so we don't know the quantities, but we do know that:

a) On page 275, Schurz (1939) says of the galleons; "*...the westbound cargo consisted of far fewer commodities and these occupied much less of the hold than did the lading in the other direction. The most important single item was the silver which had proceeded from the sales at the feria or fair (in Mexico) ....The nature of the remainder of the return cargo varied considerably during the history of the commerce.....The staple American exports to Manila generally consisted of cacao (SIC) from Guayaquil, some cochineal (a popular dye), from Oaxaca in Mexico, (olive) oil from Spain, wines and other particularly national goods.....*".
Schurz says (page 155) that the annual permiso (Maximum legal volume of commercial trade) between Manila and Acapulco in the late 17th Century was "*....250,000 pesos at Manila (eastbound) ...with a sale value in New Spain (Mexico) of not over double that amount....*" He then repeatedly establishes that this limit was generally disregarded by all concerned, from the Governor down to the lowest sailor.

This lack of respect gradually resulted in the level of oriental trade between ,Manila and Acapulco reaching such enormous sums that Crown officials in Spain became seriously concerned about the relatively small quantity of silver being exported eastward from Mexico to the mother country. When it was discovered that a major part of the precious metal was heading westward to Manila, they attempted to curb the drain. Royal cedulas on the subject were repeatedly issued, but the attitude of the colonists had become, to put it mildly, nonchalant when it came to obeying Spanish orders. This was especially true for the residents of the Philippines, who, Schurz says, "*..could trade until their coffers were filled with Mexican silver in defiance of a remote government whose long arm was rendered almost impotent by the two oceans and the continent which lay between. Contraband trading under any guise has always been considered a venial peccadillo among Spanish peoples, all law and theory to the contrary....*"

b) The documents tell us that there were consignments of silver aboard, and part of her additional lading consisted of cases of hats, cocoa, and soap, all of which was owned by General Garay Cochea.

c) The contingent of Franciscans she carried would indicate the presence of religious items.

d) Smuggling was a way of life for virtually everyone, including the General and the Admiral. (One might expect at least 25% of all cargo to be smuggled contraband.)

e) Silver was the only available commodity of Mexico that satisfied the demands of the oriental trade in silks, china, and spices.

The combination of written evidence and common practice leaves little doubt that Pilar's principle item of cargo was a substantial quantity of Mexican silver.

3. WHAT WAS SALVAGED ?

Testimony indicates that on the day after she was lost, the Admiral requested the Governor of the Marianas to assist in the attempted salvage of Pilar's silver, cannon, and anchors. At the official inquiry in April-May 1691 in Manila, it is recorded that:

a) Within four days of her loss, all her cannon and anchors were recovered.

b) Five thousand pesos of silver, belonging to a surviving officer, is recorded as having been returned to him. The documentation also includes a transcription of that portion of the manifest showing the same 5000 pesos being loaded in Acapulco.

c) There is no mention at the inquiry of any other items being recovered the year following her loss.

Based upon the inability of the Spanish to get at the silver in Pilar's hold within that year, there is every reason to believe that it, and everything else stowed below, was never recovered.

4. WHERE DID SHE WRECK ?

Witnesses testified that:

a) Just before drifting backwards into the surf and grounding, a sounding was taken at "5 1/2 brasas, more or less" (30 to 33 feet).

b) After grounding, the depth at her stern was recorded at "2 brasas" (11 to 12 feet).

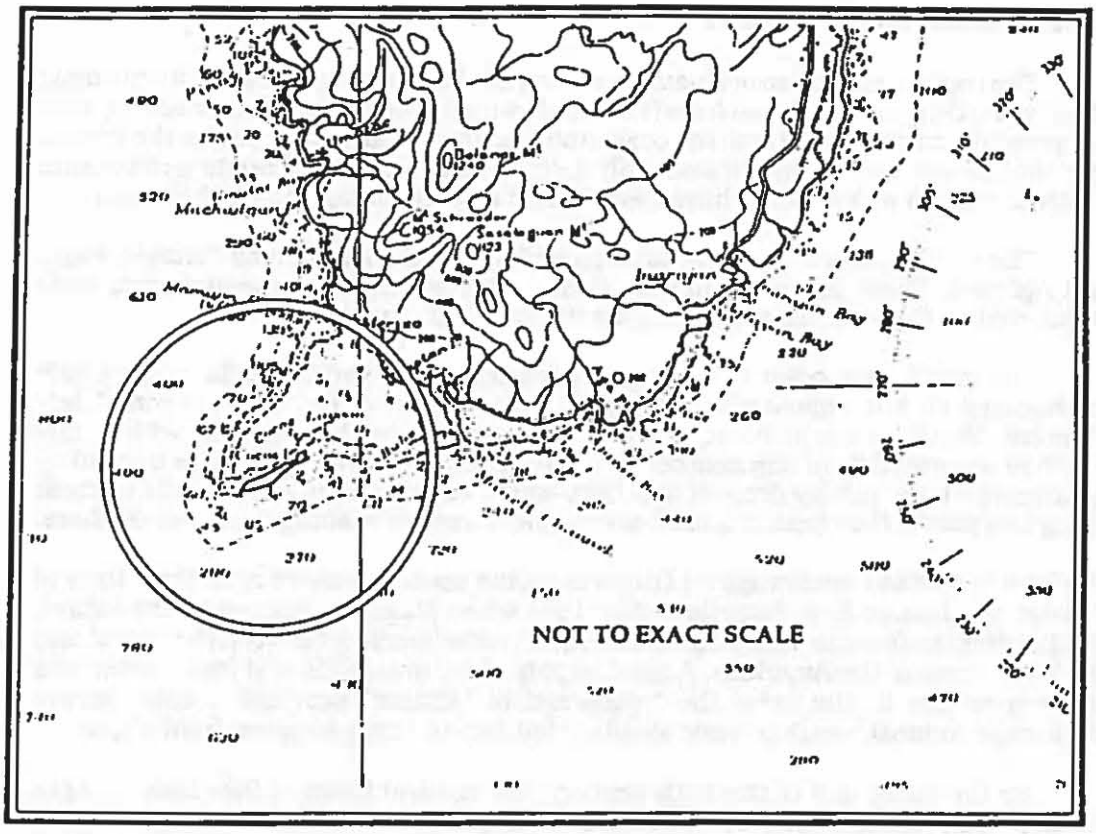
c) It was low tide when these soundings were taken.

d) She eventually came to rest on a sand bottom about one ship's length (between 90 and 120 feet) from the reef.

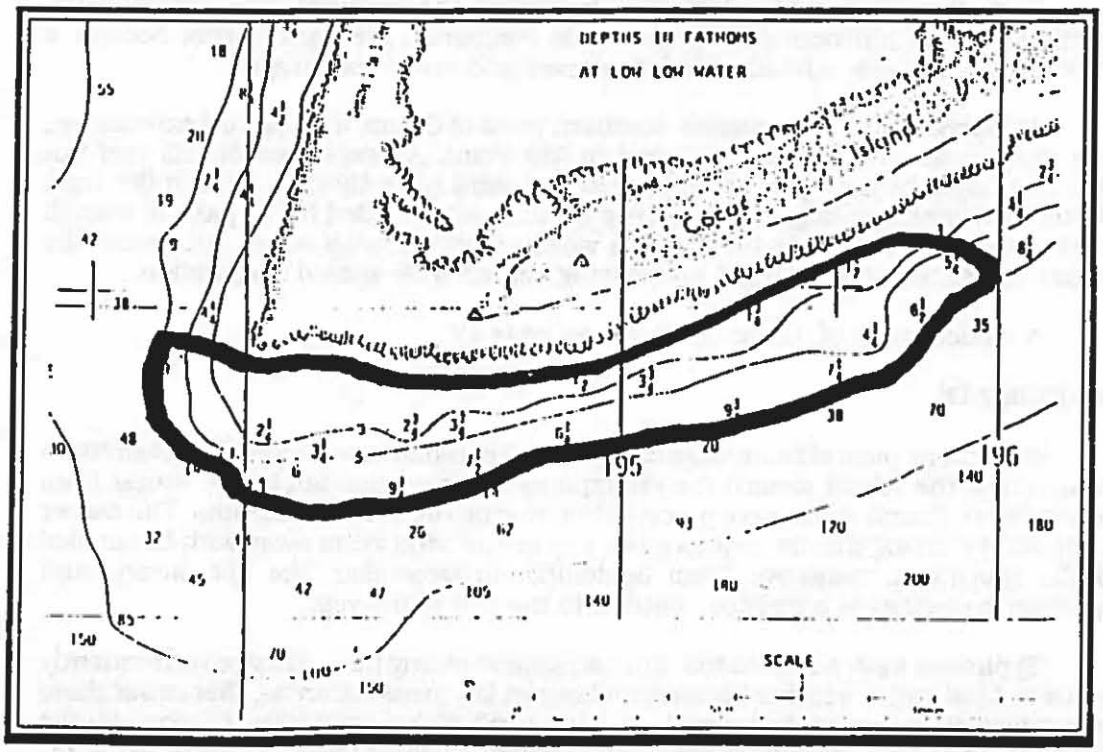
e) She wrecked on the reef which comes off the southwestern tip of Cocos.

Using this information, and observing that there have been no significant changes in the area's contours and depths since 1690, her resting place can be plotted with a high degree of accuracy. Such a plot has been made on a chart shown on the following page. The area on this which is marked out with a black border represents the primary search location for the Pilar's remains which fits the description given .

Fig 1 THE PERMIT AREA AND THE SHIPWRECK SITE.



THE SHIPWRECK SITE



3.0 HISTORICAL OVERVIEW.

3.1 PHYSICAL ENVIRONMENT.

The rugged east shore of Guam is continually beaten by rough seas during most of the year. During the annual lull of the Trade winds and the humid monsoons, seas are generally calm but still lash the coast, more so than in any other part of the Island. The shallow sea floor drops off suddenly a short distance from shore to a maximum depth of some 6 miles. Ships have never found safe anchorage along this coast.

The south eastern shore is characterized by small bays such as Tolofofo, Pago, and Agfayan. These inlets are almost surrounded by small submerged coral reefs which makes this coastline safe for only the smallest of vessels.

The north west coast of Guam is characterized by vertical cliffs making safe anchorages all but impossible. The south western part of the coast is completely different. South of Facpi Point, there are a string of shallow lagoons with sandy beaches separated from one another by rocky headlands. The lagoons are fronted by coral reefs which quickly drop off into deep water. Although the seas are the calmest along this part of the coast, it is least accessible to vessels wishing to anchor offshore.

The best roadstead anchorage on Guam is on the southern shore near the village of Umatac on Umatac Bay. Sometime after 1521 when Magellan discovered the Island, this became the favorite anchorage of European vessels sailing between the Orient and the West coast of the Americas. A good supply of natural foods and fresh water was easily available in the area; the "roadstead of Umatac" provided a safe, secure anchorage in most weather while awaiting lighters to bring supplies from shore.

By the latter half of the 17th century, the natural basin of San Luis de Apra Harbor had become an important port for visiting ships as it was closer to the capital of Agana than the more remote Umatac and a safer berth in stormy weather. The full use of Apra Harbor as a modern port did not come until the extensive dredging and reshaping after WWII. With a large breakwater on the northern side and naturally defended on the southern side by the Orote Peninsula, the Apra Harbor became a thriving Seaport with a bulkheaded inner port and outer anchorage.

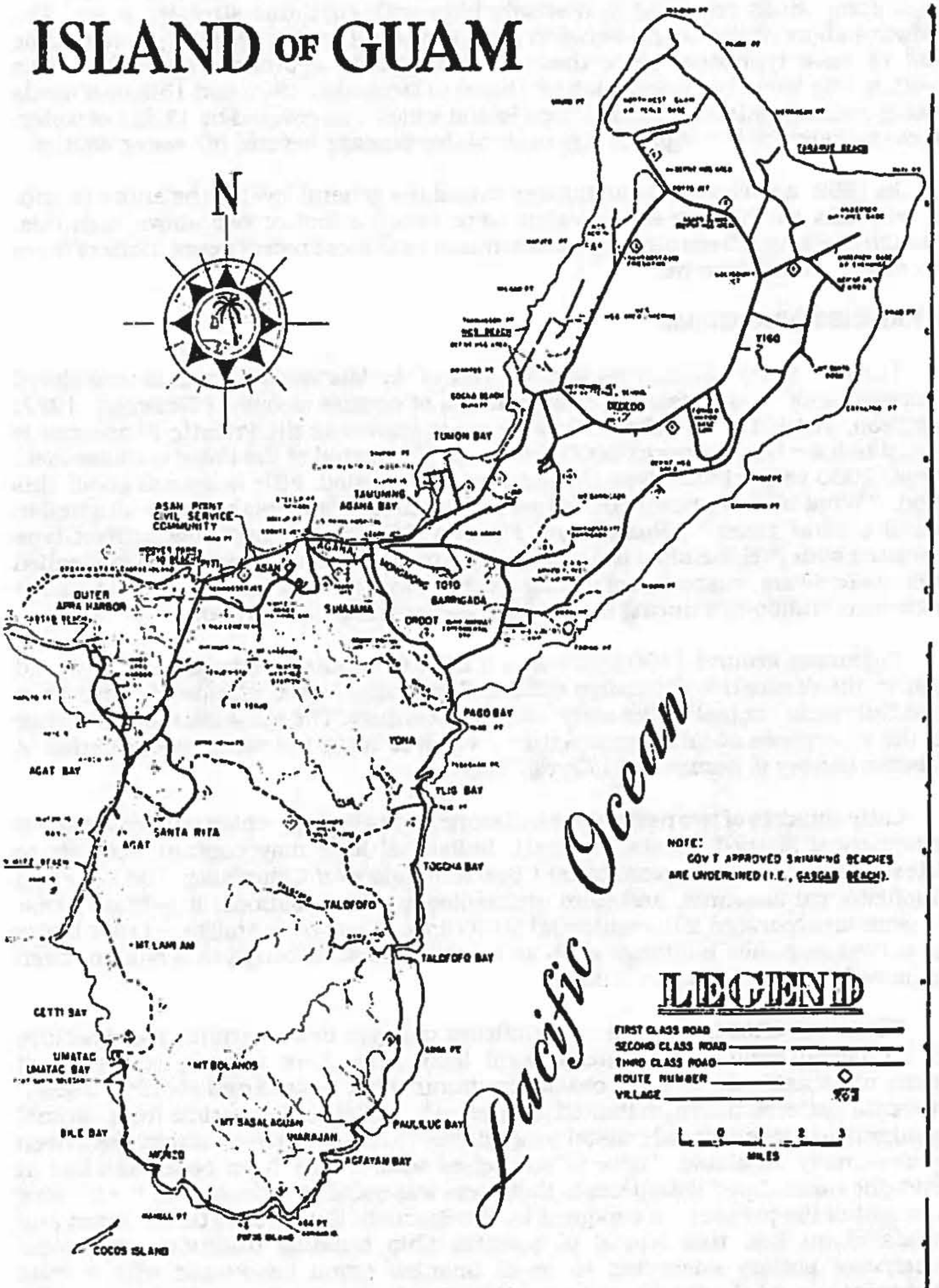
At Meriso Bay on the extreme southern point of Guam, a broad reef extends out into deep water and reaches eastward to Aga Point. An extension of this reef but separated by it by a deep channel lies Cocos Island lying about a 1 1/2 miles from shore. This low sprawling mile-long strip of land was occupied in the past by a small Coast Guard station. In 1949, during a violent typhoon, high waves cut across the Island completely inundating it and leaving behind wide spread destruction.

A modern map of Guam is shown on page 17.

3.2 CLIMATE.

Guam's tropical climate is dominated by the tradewinds which blow from NE to East across the Island toward the Philippines. Sparse rains fall in the winter from December to March with heavy precipitation during the summer months. The winter trade winds during the dry season gives way as the wind veers away with the arrival of the southwest monsoon. From September to December, the hot, heavy, and oppressive weather is a marked contrast to the rest of the year.

Typhoons have a season too, but can appear at any time. They most frequently occur in April and November because mid-ocean low pressure areas, that cause them occur most often during these times. In 1949, two highly destructive typhoons hit the Island in April and November with wind estimated at more than 135 miles per hour.


ISLAND OF GUAM
N
TARAGUE BEACH
YIGO
DEDEDO
TUMON BAY
TAMUNING
AGANA BAY
ASAN POINT CIVIL SERVICE COMMUNITY
AGANA
ASAN
PITI
OUTER APRA HARBOR
SINAJANA
TOTO
BARRIGADA
ORDOT
PAGO BAY
YONA
ILIG BAY
AGAT BAY
SANTA RITA
AGAT
TOGCHA BAY
TALOFOFO
TALOFOFO BAY
MT LAM LAM
CETTI BAY
UMATAC
UMATAC BAY
MT BOLANOS
MT SASALAGUAN
INARAJAN
PAULULUC BAY
MERIZO
ACFAYAN BAY
COCOS ISLAND
Pacific Ocean
NOTE:
GOV'T APPROVED SWIMMING BEACHES ARE UNDERLINED (I.E., GAGGAB BEACH).
LEGEND
FIRST CLASS ROAD
SECOND CLASS ROAD
THIRD CLASS ROAD
ROUTE NUMBER
VILLAGE
0 1 2 3
MILES

The most destructive typhoon in modern times occurred in November 1902. The first typhoon recorded on the Island was in 1671. Described as a "baguio" (high wind) by the chamarros, it was the most destructive ever remembered on the Island. Typhoons reported from 1671 to modern times have usually been accompanied by heavy rainfall and shifting winds resulting in a steady blow with rhythmic stronger gusts. The windward shore of the Island between Pago Bay and Umatac generally receives the brunt of most typhoons, since these storms usually approach Guam from this direction. The latest typhoon which hit Guam in December 1990 had 150 mph winds causing considerable damage on Cocos Island which was covered by 12 feet of water. However, there are few signs of any underwater damage beyond 30' water depths.

In 1902, a devastating earthquake raised the general level of the entire Island. The reef flats off the western coastline were raised a foot or two above high tide. Although there have been other such disturbances in more recent years, none of them were nearly as destructive.

3.3 PREHISTORIC GUAM.

The prehistory of Guam as with the rest of the Marianas Islands is considered as consisting of two consecutive occupations of oceanic peoples (*Reinman*, 1977; *Thompson*, 1945; 1971). The earliest phase is known as the Prelatte Phase and is thought to have begun approx 3000 years ago. The period of the Prelatte Phase lasts for over 2000 years. Even given this lengthy time period, little is known about this period. " What little is known points to small scattered hamlets that were situated in optimal coastal areas " (*Russell and Fleming*, 1989). The principal artifact type associated with Prelatte sites is a thin walled, red-slipped ceramic commonly called Marianas Redware, suspected of having affinities with pottery being manufactured in the Central Philippines during the first millennium B.C. (*Bellwood*, 1982 : 282).

Beginning around 1100 years ago, a number of changes began which would result in the distinctive Chamorro culture flourishing in the islands at the time of initial European contact in the early sixteenth century. The most distinctive change was the emergence of latte architecture (which is what the more recent period of Marianas history is named for) (*Cordy*, 1983).

Latte consists of two parallel rows of stone shafts (haleyi) which supported semi-hemispherical shaped capstones (tasa). Individual latte may contain from six to fourteen stone (three to seven pairs) (See *Kurasina and Clayshulte*, 1983). From Ethnohistorical accounts, and from archaeological investigations, it is known that latte were incorporated into residential structures. It has been suggested that larger latte served as public buildings such as men's houses, although this has not been conclusively proven (*Morgan*, 1989).

The latte period is marked by significant changes in the ceramic manufacture and a growing reliance on starchy plant food. Also there was an expansion of settlements outside the optimal coastal environments (*Russell and Fleming*, 1989). Settlement patterns based on limited data seem to radiate out over time from optimal coastal zones to less optimal coastal zones finally to inland zones that may have been only seasonally inhabited. These inland zones seem tohave been populated late in Prehistoric times. Speculation exists that there was some movement into the interior as a result of the pressure of conquest by the Spanish. Evidence of this is scant and consists of an iron nail typical of Spanish ship building traditions and some earthenware pottery suspected to be of Spanish origin associated with a latte settlement (unpublished report presented by Dr. John Craib at symposium sponsored by HPO of Guam.

One of the most distinctive achievements of this period was the Chamorro design of sailing canoe used for local seafaring and inter-island communication. These

were a slender dug-out hull with outriggers and a distinctive lateen sail. They ranged in size from small vessels for coastal sailing up to examples in excess of 40 feet in length for inter island voyages. Their startling maneuverability and swift speed caused the first European explorers to call the small boats "flying praos". Magellan, in 1521, is reported to have contacted Chamorro sailing canoes at sea long before he reached Guam. Indeed, the initial European name for the Marianas was "The Islands of Lateen Sails" (See *Terrell*, 1986).

3.5 EARLY EXPLORATION.

The modern history of Guam has been largely determined by the ships which visited her shores (*Burney*, 1967). The island's obscurity and isolation was suddenly brought to an end with the arrival of Magellan's three ships of discovery on 6 March 1521. The splendors of European Renaissance science and technology, oriental luxuries and the riches of the Americas all came to Guam in the hulls of European ships. Although these outside visitors remained for only a short time, they profoundly affected the lives of the Chamorros irrevocably. Following Magellan's voyage, Spain sent another expedition in 1525 under command of Fray Garcia Jofre de Loaisa. One of these vessels was commanded by Juan Sebastian Elcano, a veteran of Magellan's voyage. In 1564, Don Miguel Lopez de Legaspi's fleet called at the island during their voyage to colonize the Philippines.

Between 1521 and 1695, these brief but continuous encounters which culminated in establishment of a Spanish settlement on Guam in 1668, changed the culture and society of the indigenous population. Ship-borne European culture was introduced becoming a source of tools and weapons which established a basis for trade between the fair-skinned seafarers and the local Chamorro community.

As Guam became a political pawn in power struggles between countries thousands of miles away, the indigenous Chamorro life-style was profoundly effected. Their society and cultural traditions were unraveled in the face of civil disorder and disease brought on by the Spanish cross and sword. But with the Spanish presence permanently established, Guam was to play a key role in the unique maritime trade between the Orient and the Americas until 1815.

3.5 THE SPANISH EMPIRE AND MANILA GALLEONS.

For more than 300 years from the time of Columbus to the Napoleonic Wars, Spain was the world's dominant colonial power. It established an empire in Central and South America with extensive trading links through outposts in the Philippines with India, China and Japan. During these years the nation became a world superpower on a scale not seen since the Romans. Essentially, it was an expansion fuelled by gold and silver from large deposits the Spanish exploited in Mexico, Central America and Peru. (*Boxer*, 1958).

Each year the New World Fleet of up to 25 ships gathered in the Caribbean ports of Cartagena and Havana. They would be loaded with proceeds of trading for the previous 12 months and despatched to Spain across the Atlantic. These vessels were of 300 to 800 tons in size. Hundreds of them were wrecked and millions in gold and silver lost between 1550 and 1800.

Since 1960, modern diving expeditions have concentrated on Spanish galleons off Florida and in the Caribbean but they all have tended to overlook the fact that a large proportion of Spain's wealth was generated in trade with the major nations of Asia. Hub of this trade was a Spanish settlement at Manila in the Philippines. Each year between 1565 and 1815, the proceeds of its commerce were despatched across the Pacific Ocean to Acapulco in Mexico, making a major contribution to the trade carried by the New World Fleet. (*Williams*, 1982).

SPAIN AND THE PHILIPPINES

During the mid sixteenth century, the Spanish in the New World were still fired with Christopher Columbus' vision of sailing west to reach the coast of China. But by this time, because of the discoveries of Balboa and the voyage of Magellan, they were aware of the vast ocean that separated them from Asia. One of the main results of Magellan's voyage was to make, in 1521, the first European discovery of the Philippine archipelago. In 1564, the Viceroy of New Spain despatched a fleet of five ships with 400 people on board to establish a permanent presence in these islands. The expedition was commanded by Miguel Lopez de Legaspi. Initially, a settlement was

made on Cebu, but Legaspi moved it later to the shores of Manila Bay. At this site, the walled city of Intramuros was built as a permanent trading centre. (*Schurz*, 1939).The Spanish in Manila traded precious stones with India; silks, porcelain, jade and works of art with China; porcelain, silks and works of art with Japan and spices with the smaller nations of South East Asia. All of this activity was financed by shipments of silver and gold coins from the mints of Mexico and Peru. In fact, so pervasive was the Spanish influence in East Asia, that for two hundred years the silver piece of eight was the standard currency for trading on the Chinese coast.

THE PACIFIC TRADE ROUTE

To connect this trade with their major shipping routes to Spain from the American Colonies, the Spanish had to establish a trade route to traverse the Pacific Ocean, the largest expanse of water on the planet. The initial reconnaissance of an eastwards passage across the Pacific was made by the galleon San Pablo in 1565. This vessel sailed with a small cargo of cinnamon and left the Philippines by way of the San Bernadino Strait. Her pilot took her just south of the Japanese coast into the Trade Winds, which carried her to the coast of California and thence to Acapulco. This basic route was to remain the track of eastbound galleons for more than 250 years. However, unlike the New World Fleet, Spanish galleons sailing the Pacific route between Manila and Mexico faced a voyage of 5 to 6 months duration.

The return voyage was a little less onerous and could be made in as short a time as 3 months. This was made on a southerly route from Acapulco to pick up the trade winds along a latitude of approximately 10 degrees north. The galleons then rode these winds to the Philippines passing through the Marshall and, sometimes, the Caroline Islands. For the first 100 years of the trade, westbound galleons made the voyage between Acapulco and Manila direct. However, in 1668, a Spanish settlement and military garrison was established on Guam to provide a watering point for Manila bound galleons. A fort and small town was built at Umatac. From this time on, all ships inbound from Acapulco called into Guam, at Umatac or Agana, the main settlement, before completing their passage to Manila.

THE MANILA GALLEONS

European style galleons were too small for such a long route so very large purpose-built ships were constructed in the Philippines. There, the work was carried out by local people supervised by Spanish shipwrights. The vessels were built from local timbers such as teak and were several times the size of European built galleons. The Manila ships reached 1500 tons in the 1600s and 2000 tons in the 1700s . It would be the late 1800s before other nations' shipbuilders produced commercial sailing ships of comparable size. As well the Manila galleons were heavily armed with at least 50 of the largest naval cannon available at the time they were built. Although slow and cumbersome they had sufficient carrying capacity for cargo, passengers and stores to under-take long voyages across the Pacific.

The Philippine-Mexico trade flourished strongly for 250 years and in this period

it followed a consistent pattern. Each year ships sailed from Manila to Alcapulco with the proceeds of Spain's trading in Asia. For the return voyage to Manila via Guam, the galleons were loaded with silver coin to underwrite Spanish commerce in Asia for the next 12 months. Sources indicate that one third of all the silver output from mines in Mexico and Peru was shipped to Manila. So large were the consignments of silver coins that some galleon captains are recorded as using them to ballast their ships. This consistent trading pattern, undertaken by royal galleons for 250 years, remains one of the greatest chapters in Pacific History. It is maritime history's longest running continuous service by a single line of ships. And yet, in the world at large, the amazing story of the Manila Galleons is almost unknown and has not had the recognition it deserves.

3.6 THE MISSIONARY PERIOD

Until 1668, the Marianas were used occasionally by the Spaniards for only one reason : to provide water, food and other supplies to replenish galleons making the annual voyage between Acapulco and the Philippines. The resupplying effort was done relatively cheaply and easily as far as what was required from the Spaniards. But the situation changed with religious feeling and missionary activity being accelerated by European sovereigns. Urged on by the wishes of the Pope, there was mounting pressure to bring faith and Christianity to the "barbarous people living everywhere". Thus the desire to spread the Christian religion to people living in the Islands of the Pacific, became a secondary reason for the colonization of the Marianas. (*Driver*, 1984).

In 1662, the galleon San Damian stopped at Guam for water. Among the missionaries, who were bound for the Philippines, was Father Diego Luis de Santivores. Watching the Chamorros in their canoes as they surrounded the ship, this Jesuit priest was so impressed by their qualities, that he vowed to establish a mission on the island. After much lobbying to overcome opposition within the Spanish administration, Father Santivores was successful and his mission arrived on Guam on 15 June, 1668. Using Guam as a base, the mission attempted to spread Christianity to all of the Marianas Islands. The next 25 years were a period of turbulence and violence which saw the Chamorro people decimated by war and disease, but at the end of the time Christianity was firmly in place and the beginnings of modern Guam were laid. (*Repetti*, 1971).

3.7 THE NINETEENTH CENTURY.

This era saw Guam decline and become plagued by a shortage of natural resources. The end of the Manila galleon trade in 1815 removed one of Guam's reasons for being and regular visits by overseas ships became spasmodic. The island was, however, a focus for scientific expeditions with three such groups visiting between 1817 and 1828 to study local flora and fauna. Whalers began to visit the island during the mid 1800's. (*Morris*, ND). Spain's decline in the world saw a shortage of funds allocated to the local administration which caused conditions on the island to deteriorate. Natural disasters during the century which included earthquakes, typhoons and epidemics added to the general malaise.

The end of the century also brought Spanish rule of the islands to a conclusion after 230 years. In 1898, during the Spanish American War, a US navy warship appeared off Agana, landed marines and took control of the island. With the signing of a treaty to conclude hostilities, Guam became a trust territory of the United States.

3.8 WORLD WAR II.

Guam remained a colony of the United States until December, 1941 when it was lost to Japanese forces just three days after the attack on Pearl Harbor. Regaining the Island was not only a point of honor for the United States but also an important

strategic move to provide an advance naval air base in the Central Pacific for staging B-29 bomber raids upon the Japanese Mainland. (*Corano and Sanchez*, 1964).

The recapture of Guam had been scheduled as phase II of the Forager operation. The landings were slated to begin immediately following the invasion of Saipan to the North. The battle for Guam began on 21 July 1944 at the same time as the Tinian Campaign. The size of the Japanese forces and their island defenses were strengthened in late 1943 to prepare for the American push through the Central Pacific.(*Peattie*, 1988). The new emphasis upon the defense of the Marianias was based upon the belief that Guam and the Islands to the North were "Japan's final defensive line" (*Dower*, 1986). The total number of Japanese defending Guam at the time of the American invasion was a minimum of 18,500 men.

The Japanese were expecting to face four or five American divisions, a force adequate for landing operations on two fronts (See Maps on pages 23 and 24). The immediate concern for the Japanese was the defense of Apra Harbor and the Island's three air fields. 30 fighter planes were based at the air field near Sumoy on the Orote Peninsula; other air strips were Tiyan near Agana and near Dededo.

The American naval and air bombardment began on 8 July and continued for 13 days to prepare for the landings. An earlier naval bombardment occurred on 16 June when two battleships, a cruiser, and a number of destroyers shelled the Orote Peninsula for two hours. Planes started bombing Guam on 11 June hitting the enemy air fields particularly. The systematic bombardment of Guam assumed a scale and length of time never before seen in WWII (*Palomo*, 1984). From 8-21 July the firing of naval ammunition against shore targets amounted to 836 rounds of 11 inch, 5,422 of 14 inch, 3,862 of 8 inch, 2,430 of 6 inch and 16,214 of 5 inch shells (*Crowl*, 1960).

From the beginning, the Japanese had suspected that the landings would be on the West Coast focused on Apra Harbor and the Orote Peninsula. They did not rule out a possible small American landing at Pago Bay on the East Coast for the purpose of getting behind their lines, but their defense efforts were almost completely devoted to the West Coast. (*Russell and Fleming*, 1989).

The American assault on Stevedore, the code name assigned to Guam, was focused on the early capture of the Orote Peninsula, Apra Harbor area to secure the use of the harbor and the major air field. Two assault points were 5 miles apart:, creating the situation of two almost separate military operations by the same landing force. The major invasion thrust was restricted to 14 miles of coastline from Agana to Bangi Point. The operational areas where most of the fighting took place are shown on the map on page 25.

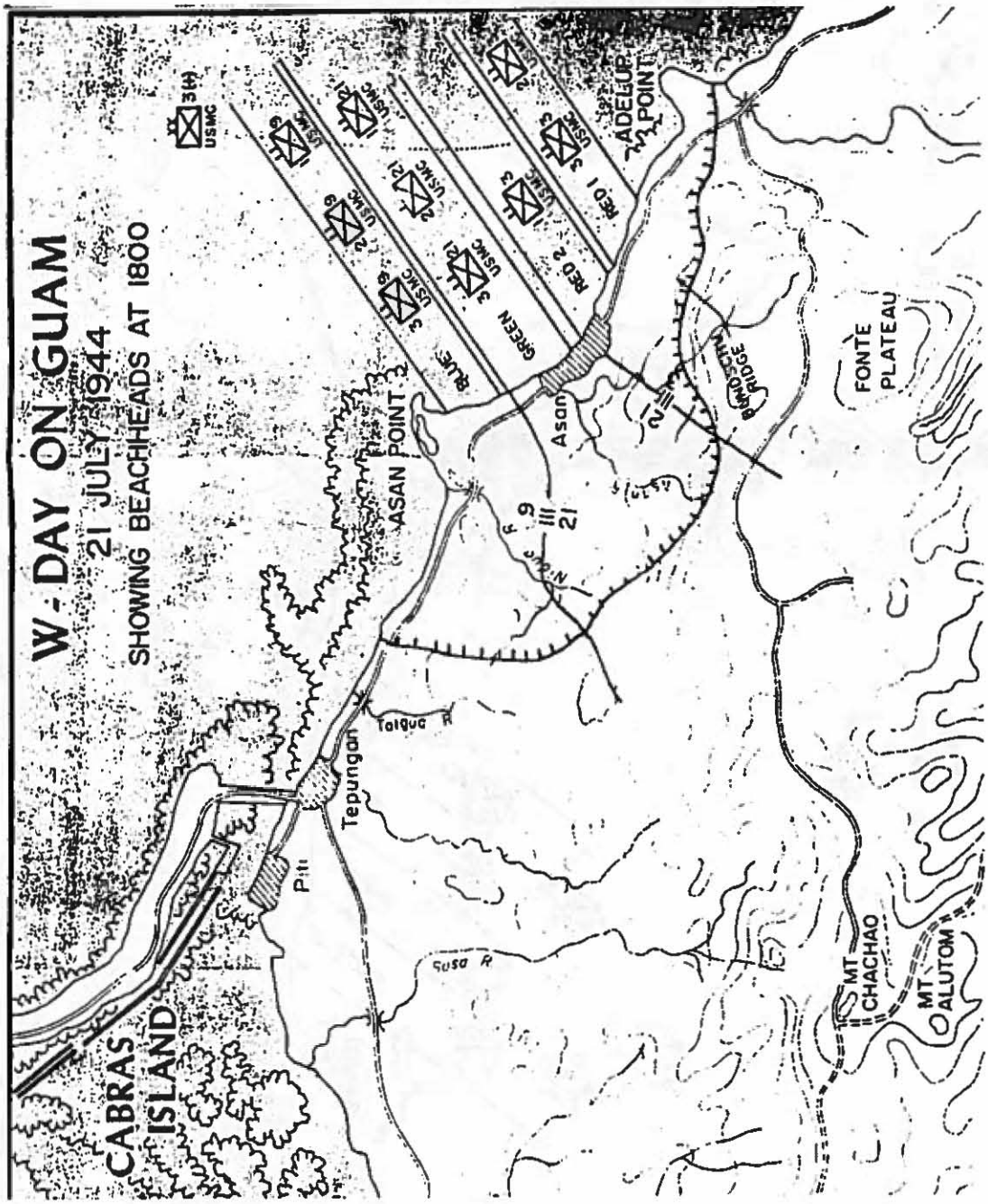
Before the American forces launched a drive north on an island-wide front from the lowlands between Agana and Pago Bay and up into the northern plateau, assurance was needed that the rear was secure from attack. The 77th Division sent infantry patrols to investigate reports that the Japanese might still be present in strength, particularly in the center of the island near Mt. Laurians. Five patrols were set out, two for objectives on the east coast, two to the south-east, and one down the southwest coast. None of these patrols reported enemy resistance in strength, as all Japanese forces were heading North. Once American forces realized that no significant Japanese resistance was present in southern Guam, all attention was given to the final northern campaign as small scale "mopping up" proceeded in the south (*Sanchez*, 1988).

UNDERWATER CULTURAL RESOURCES

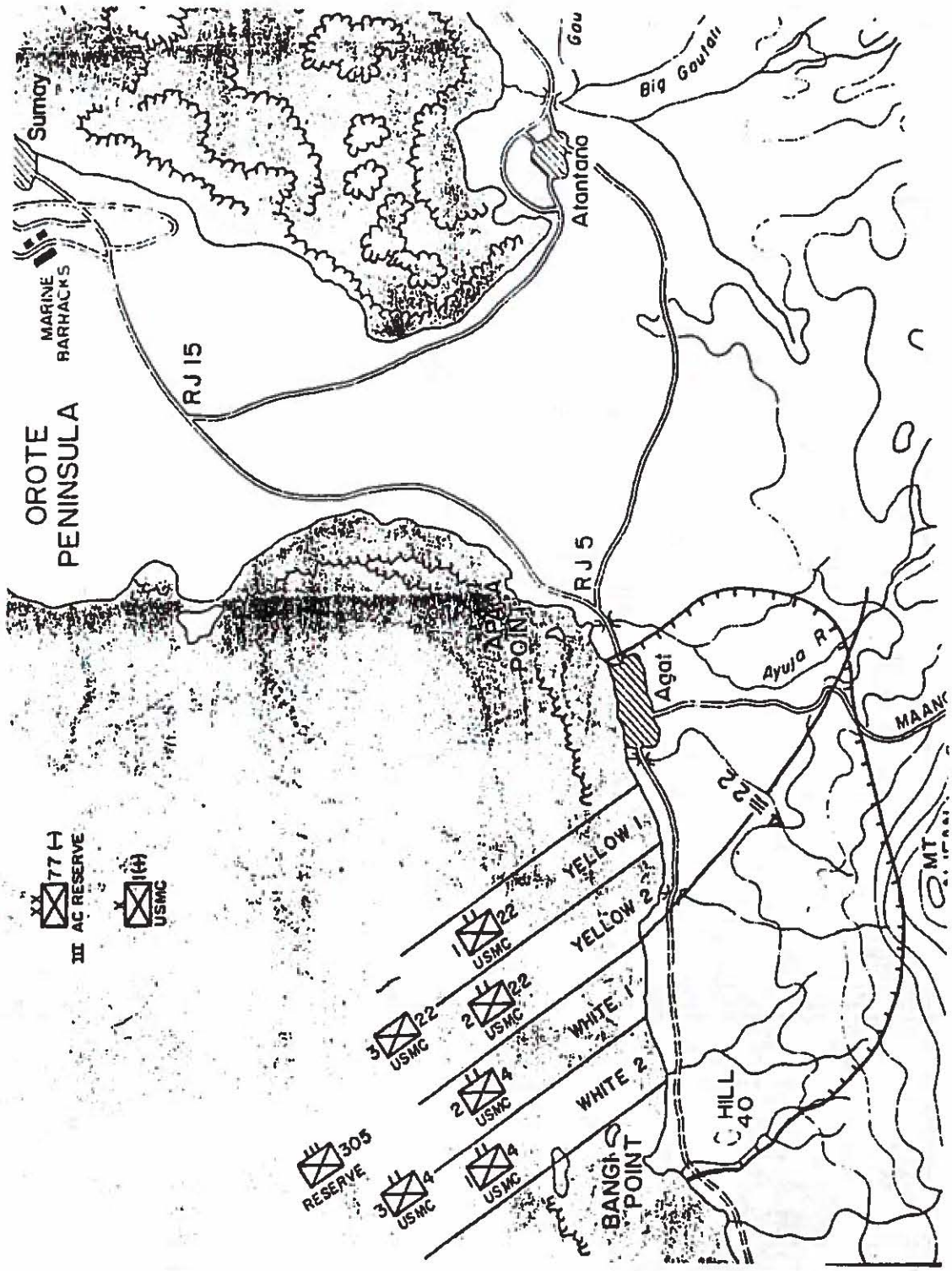
The Japanese defense positions and the two pronged attack by American forces were concentrated in the Agat Bay-Apra Harbor-Orote Peninsula on the west central

coast of the island. Apart from the northern plateau campaign beyond the Agana-Pago Bay road, most of the fighting took place within a 40 mile coastal strip between Bangi Point and Pati Point. Cocos Island on the southeast tip of Guam, witnessed very little, if any, directed air-naval-land bombardment during the invasion campaign. Unlike the submerged areas along west central coast, southeastern waters would be expected to contain relatively few physical remains of the conflict. Any scatter of modern metal/material found off Cocos Reef would most probably date to the post WWII period associated with the development of the military naval station on Cocos Island. In some 40 dives in the general area of Cocos Reef, PP's divers have located a few isolated examples of US-origin ammunition in sand holes. These have mainly been 30-06 calibre full metal jacket small arms rounds. No major war debris has been seen.

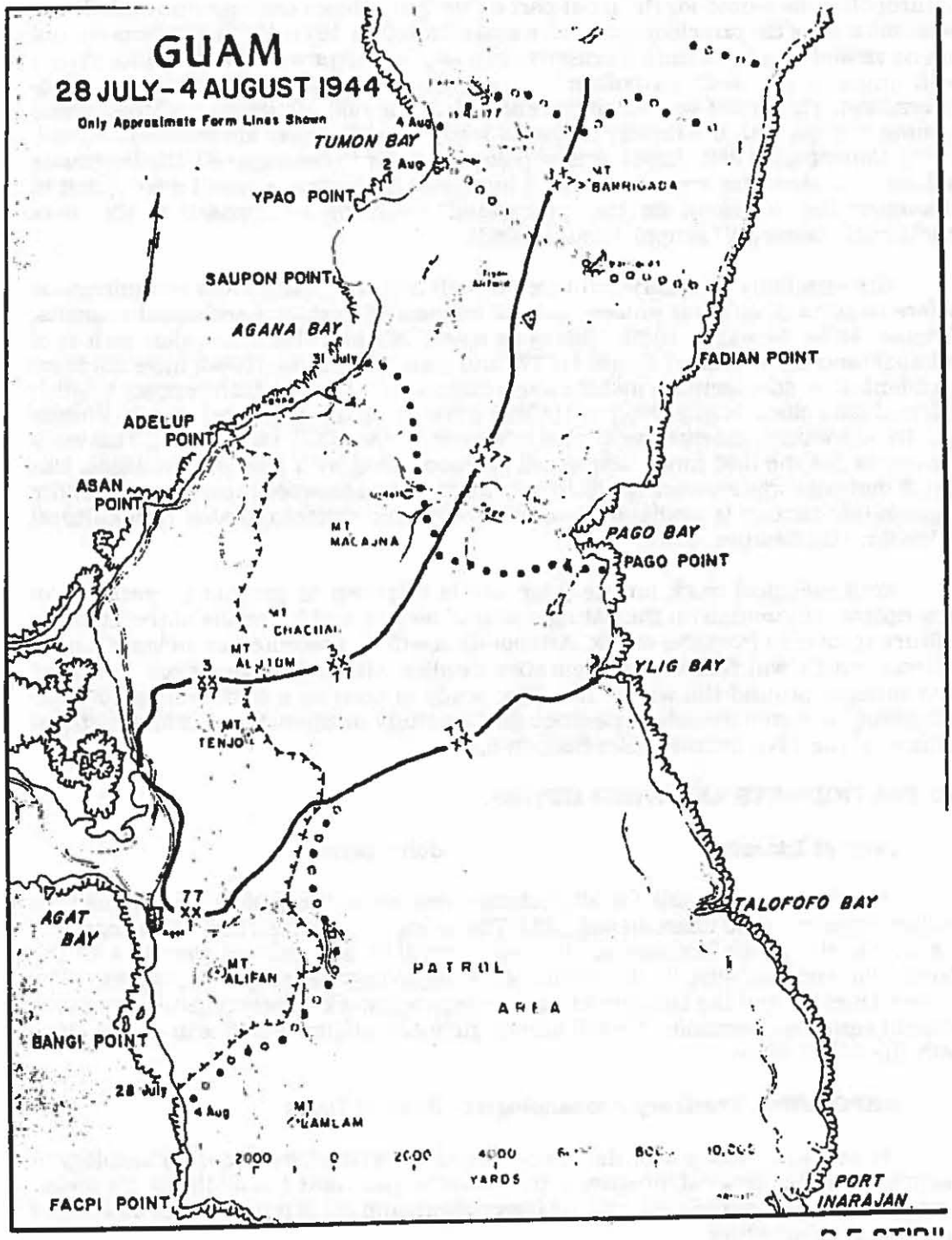
ASAN BEACHHEAD



AGAT BEACHHEAD



OPERATIONAL AREAS 1944



4.0 RESEARCH DESIGN.

4.1 OBJECTIVES.

Shipwreck archaeologists, particularly those trained in the United States as anthropologists, would for the most part agree that artifact descriptions and classifications are not the principal goal of research (*Muckelroy*, 1979,1980). Artifacts should not be viewed as an end unto themselves but as a way to provide the raw data to deal with larger issues such as culture change, environmental adaptation and social interaction. This belief was strongly reflected in the mid 1970s by anthropologists coming to grips with the rapidly changing world of underwater archaeology (*Arnold*, 1978; *Cummings*, 1982, 1986). Anthropologists eager to demonstrate the legitimate nature of underwater archaeology as a bona-fide theoretical pursuit were quick to champion the argument for the "processual" approach as opposed to the more traditional "historical" school. (*Gould*, 1983).

The variability of material culture through time and space must be understood before aspects of cultural process can be delineated from archaeological remains. (*Trigger*, 1989; *Beandry*, 1989). This is as true of historic shipwreck sites as it is of colonial land sites. Stanley South (1977) and Ivan Noel-Hume (1980) have made an excellent start documenting historic site artifacts for 17th and 18th century English colonial land sites. Kathy Deagan's (1988) work on Spanish colonial sites in Florida and the Caribbean is a most welcomed reference for the 1500-1800 period. This work combines ,for the first time , shipwreck artifacts along with land assemblages. But much more descriptive work needs to be published on shipwreck assemblages before enough information is available to satisfactorily link artifact remains with cultural behavior. (*Mathewson*, 1991)

Archaeological work on the Pilar site is intended to provide a synthesis of descriptive information on the dating, cultural origins and functions of the material culture recovered from the wreck. Artifact data will be presented in a classificatory scheme which will facilitate comparative studies with other shipwreck and land assemblages around the world. The Pilar study is seen as a contribution towards compiling a comprehensive reference for the study of Spanish maritime material culture of the 17th century. (See Section 5.6)

4.2 PARTICIPANTS AND THEIR DUTIES.

Project Director John Bent

He will be responsible for all decisions relative to the project operations (See Project organizational chart on page 33). The safety of personnel and the integrity of the wreck site will be foremost at all times. He will be in continual contact with the Territorial Archaeologist in the SPHO office regarding the project's progress. The Project Director and the Director of Archaeology will work closely together to assure smooth running operations. He will handle all public affairs activities in conjunction with the SHPO office.

SHPO office/Territory Archaeologist Richard Davis

He will work closely with the Project Director and the Director of Archaeology to assure the archaeological integrity of the wreck is maintained at all times. He is also responsible for keeping SHPO and the Government and press representatives advised of all ongoing activities.

Director of Archaeology R. Duncan Mathewson III

He is responsible for overall archaeological conduct of the project and for

ensuring that the operations do not damage the integrity of the wreck within the guidelines agreed to with the SHPO. He is also responsible for coordinating on-site and shore activities of the participating conservation staff, consulting scientific staff and archaeological divers. He will work closely with academic personnel at MARC and University of Guam concerning teaching and training programs.

Assistant Project Director TBA

He will assist the Project and be responsible for the overall safe and efficient boat operation and for all on-site water and diving activities. He will work closely with Project Director and the Director of Archaeology to assure that all diving and excavation procedures run smoothly.

Archaeological Conservator Jim Sinclair

He is responsible for setting up adequate underwater artifact retrieval, artifact stabilization and storage on project boats and shore facilities. He will work closely with the Project Director to develop a volunteer and student intern laboratory training program. He will be responsible for the stabilizations, treatment and curation of all artifacts.

Project Archaeologists/Historians

Bruce Chappel	Research Historian
Phil Masters	Research Historian/Diver
Bob Cembrola	Archaeologist/Diver
Daniel Koski-Karell	"
David Moore	"
Walter Zacharchuk	"
Corey Malcolm	"

They will be responsible for working closely with the Director of Archaeology to carry out all site procedures for achieving objectives outlined in the Reseach Design.

Consulting Scientific/Museum Staff TBA as required.

They will work closely with the Director of Archaeology and the Archaeological/ Historical staff on specific analysis and interpretation problems as they arise during the processing and research of artifacts.

4.3 ARCHAEOLOGICAL TEAM.

The project will be conducted by a professional archaeological staff and consultants as well as volunteers and University students who will receive training for specific tasks. The archaeological team will consist of the following : (See Appendix A for Vitae)

Director of Archaeology	R. Duncan Mathewson III Executive Director, National Center for Shipwreck Research, Ltd Key West, Florida.
Research Historian	Bruce Chappel Archivist, University of Florida Library, Gainesville, Florida.
Research Consultant	Phil Masters Private Consultant,

	Gainesville, Florida.
Conservator	Jim Sinclair Private Consultant, Key West, Florida.
Archaeologist	Bob Cembrola Curator US Naval Museum Newport RI.
Archaeologist	David Moore Private Consultant Greenville , North Carolina.
Archaeologist	Walter Zacharchuk Private Consultant Key West, Florida.
Archaeologist	Corey Malcolm Private Consultant Key West, Florida.
Archaeologist	Daniel Koski-Karell President, Karell Institute, Arlington, Va.
Archaeological Divers	Brendan O'Connor, Guam. Andy Matroci, Key West, Fl. Paul Bent, Guam.

4.4 GENERAL PROCEDURES.

GENERAL

Conduct of the Project will be divided into three stages based upon the archaeological requirements of the operation (See Phase I and II Schematic Operational Plan on pages 34 and 35). The phases are as follows :

Phase IA - Site Survey and Identification.
This first phase will provide a fine-grained remote sensing map of all anomalies detected with a magnetometer, metal detector, and side-scan sonar.

All ferrous and non-ferrous artifacts indicated by remote sensing and/or visible on the surface will be identified and mapped in-situ. Major site parameters and archaeological identity will be determined with bottom grid lines tied into surface control buoys. Full project resources including and artifact stabilization treatment and storage facility will be established on shore. Diagnostic artifacts important for answering specific questions concerning the dating and identification of the wreck site will be recovered after being measured and mapped in-situ.
Estimated Time : 8 months.

Phase IB - Archaeological Mapping and Test Excavation. This second part of the survey phase will involve the mapping of the site in detail identifying the layout of wreckage and associated artifacts in situ. Careful and precise test excavations will be made to determine stratigraphic and horizontal spatial relationships of cultural material.
Estimated time : 1 year.

Phase II - Excavation and Artifact Stabilization. This phase will involve the recovery and stabilization of all the material excavated from the site. Methodical techniques used in phase II survey will be utilized to scientifically record, map and photograph artifactual layers of material during the excavation.
Estimated time : 3 years.

4.5 PHASE IA - SITE SURVEY AND IDENTIFICATION.

Concept And Purpose.

The aim of this first stage of the Project is to survey the wreck area electronically to establish an overall scatter pattern of metal objects and shipwreck remains so priority areas can be identified for archaeological investigations (See *Aruskiewicg*, 1989). The objective of the work is to conduct electronic scanning of the seabed and to closely investigate detected magnetic anomalies. A non-random distribution of homogenous cultural material dating to the pre-1690 period will be used to determine the limits of the Pilar site. All anomalies identified as belonging to other sites and/or periods will be mapped and left in-situ. Data collected in the field will be used to create a pre-disturbance master site layout plan as the basis for further investigations of the wreck. The efficiency and effectiveness of the project will be greatly enhanced by maximum use of the latest technological advances in the areas of archeological mapping, computer aided programs, metal detection and geological investigations (See *Arnold*, 1975; *Fish and Carr*, 1990). Use of these techniques will be both cost and time effective and will enable the Project Team to establish a reliable data base about the depositional nature of the site and the distribution of cultural deposits. This information will be vital in the planning and conduct of all future archaeological operations.

Operations.

The conduct of Phase I will be divided into two stages. In stage 1A minimum resources will be deployed and used to electronically map the wreck site by identifying

the presence of metallic concentrations. Once this is done, full project resources will be mobilized and concentrated on Guam to carry out the total project.

As the site has probably been impacted by several typhoons and an earthquake, modern electronic magnetometry and underwater scanning, both sub-sea and sub-bottom, will be used as required to carefully examine the whole permit area for any evidence of breakup of the vessel and later disintegration and scattering of the remains. This survey will cover a three statute mile radius around a point fixed on Latitude 13 degrees 15 minutes 30 seconds North and Longitude 144 degrees 39 minutes 00 seconds East. The first priority will be to accurately define the different zones so that archaeological surface and sea bottom datum points can be precisely plotted and located at any time. This will be done with a position fixing radio trisponder system or a Global Position System (GPS) Unit (See appendix B). All points of interest ("loci") will be plotted on a two dimensional grid measured by the electronic grid co-ordinator. The coordinates will then be used for plotting the archaeological layout of the site in a computerised CAD/CAM system (See *Ruggles and Rahtz*, 1988).

In stage IB the parameters of the primary cultural deposits will be fixed by a fine grained metal detecting survey and a computer enhanced proton magnetometer (*Arvidson*, 1990 a and b). In this way the archaeological team will fix the locations of significant magnetic anomalies with an indication of their extent and depth in the sediment. The overall distribution mass of the ferrous objects will generally define the locations of about 90% of non-ferrous artifact concentrations. Divers will investigate such anomalies with hand-held pulse metal detectors. The electronic plot of the location of each main artifact cluster will be further enhanced by the divers' recorded descriptions and findings to build a complete electronic survey map of the site. As this map develops, the survey of the area will be supported by side scan sonar sweeps and sub-bottom seismic profiling as required. Results will be used to build up an artifact scatter pattern over the whole shipwreck site. Divers will also use a SHARP survey point fixing system underwater which will allow precise electronic positioning and calculation of point to datum coordinates for the mapping of any articulated wooden hull structure which may be identified. This data will be loaded into a CAD/CAM system for architectural interpretations (*Good*, 1986). (See Appendix B).

During the survey part of the project, all anomalies and buried artifacts will be uncovered by hand-fanning with a minimal amount of overburden disturbance. In this phase of the operation sand and coral rubble in shallow depressions and solution holes in the fossilized limestone bedrock will be examined for artifacts and rock ballast from the breakup of the vessel.

The dive team will be supported by a land based project office which will provide technical computing facilities and all administrative and logistic support.

Eighteen months have been allowed as the time frame necessary to complete the field work for both stages of Phase One and to complete a comprehensive report of its results.

EQUIPMENT REQUIREMENTS

The following major equipment and facilities will probably be required for phase one : -

A. OPERATIONAL SERVICES

. Survey/Diving Vessel with suitable electronic and diver support equipment.
. SHARP electronic survey point fixing system,
. Seismic Sub-Bottom Profiler/Side Scan Sonar,
. Proton Magnetometer Services Contract,

. Trisponder Position Fixing System,
. Home Berth Facility for dive vessel,
. All-weather Mooring at permit area for dive vessel,
. Underwater Camera Equipment (still and video).

B. PROJECT SUPPORT SERVICES

. Lab Stabilization Facilities
. Office Accommodation
. Office Communications
. Office Support Equipment
. Research Services
. Light Workshop Facilities
. Transport Vehicles
. Team Accommodation (Houses or Apartments)
. Housekeeping, Catering and Laundry Services.

4.6 PHASE IB - ARCHAEOLOGICAL MAPPING & TEST EXCAVATIONS.

This stage of the project involves the preparation of a highly detailed site survey and map of the wreck. Phase IB is expected to take 6 to 9 months to complete. It uses electronic and photographic mapping techniques to draw a scaled plan and to fix datum points and triangulated reference markers on the sea-bed. The work is essential to an understanding of the physical layout of the ship's remains. This will give vital indications about the manner in which the galleon has broken up and spread over the bottom. This knowledge will enable identification of the various sections of the wreck and so determine priority for excavations during phase II. Limited test excavations will be undertaken with a 4" venturi water dredge for the recovery of diagnostic artifacts. All excavated holes will be back filled with the sand and coral rubble after all artifacts and rock ballast have been recorded. No more than 10 cubic yards of overburden will be displaced.

Much of the proton magnetometer scanning carried out in phase I will provide baseline data for excavation operations. Indeed, phases IB and II are integrated segments and follow each other in a natural progression. But, the conduct of phase II depends on the results obtained by the fine grained remote sensing scanning and archaeological pre-disturbance mapping. At the present time, we believe that the conduct of Phase II will be determined by one of two options :

Option One :

Research so far, and physical evidence gathered from Cocos Reef indicates that the majority of the cultural deposit will be in water less than 35 meters deep. Therefore very little further capital expenditure will be required as most capital equipment, staff, accommodation and facilities are provided for in phase I costings. Some additional funding is needed for special requirements for the following :

Tapes, films, buoys
Surface Supply System (Divers)
Security for site - Three staff
- boat
- vehicle
Administrative/Support Costs

Option Two :

If the magnetometer scan and the other remote sensing data shows that a

substantial amount of the main cultural deposit is located in water more than 35 meters deep, then additional diving technology will have to be brought in. Careful assessment and evaluation of the site will be made to decide which deep water technological diving method to proceed with. The choice will be between roving robotics and/or saturation diving. Both methods are expensive and would need further capital investment based upon current projected costings. We believe, though, that on present indications the main site is at a depth which will not need these facilities.

4.7 DEPOSITIONAL ENVIRONMENT.

Reconnaissance dives and discussions with marine biologists at the University of Guam Marine Lab have provided a good basic understanding of the different depositional environments on the Pilar site. A review of the available literature concerning offshore benthic environments has provided general background data on the geology and bathymetry in the immediate area southwest of Cocos Reef. The major references consulted were Stojkovich and Smith (1978), Randell and Sherwood (1982), Randell and Eldredge (1976), Myers (1989) and Emery (1962).

Reconnaissance dives on the site off the southwest part of Cocos Reef suggested three different shipwreck zones. A preliminary diagrammatic cross section across the site illustrates the main geological and biological features on the site (See Fig.2 on page 45).

ZONE I : 0'-30' **Upper High Energy Surf Zone**. This Zone is characterized by modern coral growth and algae within the 5' depth from low water on the barrier reef platform. This zone represents the initial impact of the Pilar and the primary break-up of the vessel. Small finds from the disintegration of the sterncastle and the upper superstructure during the initial impact and the short salvage attempt should be scattered in this zone due to subsequent typhoon and storm displacement of bottom artifacts brought up from deeper water depths.

ZONE II : 30'-60' **Transitional Zone**. This Zone consists of a pleistocene former sea level characterized by fossilized coral limestone hardpan. The coral growth in this part of the site occurred probably over 10,000 years ago, when the sea level was lower than it is today. Sporadic modern day coral growth in small isloated clumps is widely scattered in water depths from about 30'-40' with less coral growth observed in deeper water. Sporadic growth of green algae is also seen in the shallower areas of this zone. Sand and rubble overburden occurs in gullies, erosion holes and shallow basins running along the center of this zone. Gullies in the escarpment and eroded overhangs at its base, separating Zones I and II contain several feet of sand and eroded rubble. Secondary breakup of the vessel and partial stabilization of the shipwreck material occurred in this zone, within a short time following the end of the salvage efforts. Most of the upper superstructure of the hull was probably dismantled for building materials while divers attempted to recover goods and material from beneath her weather deck. The lower hull would have been little affected by the salvage efforts although some ballast rock scatter is to be expected in Zone I, where she broke her back. Most of the ballast deposits should be associated with remaining articulated hull timbers in the deeper water of Zone II.

ZONE III 60'-100' **Middle Zone**. This second submerged Pleistocene former sea level is laso characterized by fossilized coral limestone hardpan. It has little or no modern day coral growth. This part of the site is associated with an ancient sea level, which probably dates from a warming period during the last interglacial period over 20,000 years ago, when the sea level was over 60 feet lower than it is today. There is very little, if any, sand or rubble overburden in this zone except where there are gullies and holes eroding down through the coral hardpan. Few, if any, pelagic fish were observed and coral growth was negligible. Tertiary scatter of the wrecksite largely due to hydrological conditions during typhoons and the one severe earthquake reported

will probably characterize this zone. Shipwreck material tumbled down from the higher Transitional Zone will be scattered in a pattern largely dependent upon the specific gravity of individual artifacts.

Lower Zone : > 100'. Underwater investigations have not yet been extended to depths over 100 feet. There are some bathymetric indications that there is a 3rd pleistocene level around the 250' isobath. This sea level period should date to the mid pleistocene period. It is conceivable that some shipwreck material may be scattered down to these depths and even beyond. Scattered gorgonia generally characterize this zone.

ARCHAEOLOGICAL HYPOTHESES TO BE TESTED

1. The main artifact scatter pattern is aligned across all three Zones (I,II,III) with the main concentration of cultural material and rock ballast closely associated with the disarticulated lower hull timbers within Zone II.

2. Major artifact clusters will be associated together in erosion depressions and solution holes in the bare coral limestone bedrock.

3. Small scattered artifacts will be found in the upper Zone (I) and in the erosion gullies leading down to the transitional Zone (II).

SUMMARY.

At this stage any conclusions can only be considered preliminary until underwater observations are checked with precise measurements and quantitative data. However, it is possible on the basis of preliminary examinations to make several statements :

1. The main part of the Pilar site lies within Zone II in the area where the water is the roughest and the current is the strongest. By using this criteria alone and matching it with the magnetometer hits, mapping etc, it should be possible to begin to focus on the site relatively quickly once Phase 1b operations begin.

2. The relative lack of recent coral growth and bottom overburden in the over 30' water depths will help make the site "stand out " from its natural depositional environment.

3. The archaeological excavations of the site will involve little or no adverse impact on the surrounding benthic communities.

BENTHIC ENVIRONMENT.

Benthic biota (algae, corals and other macroinvertebrates) seaward of the SW part of Cocos Island define different biotopes as defined by substrate, accretional and erosional processes, hydrologic factors and association of living organisms. The main characteristics of these biotopes are represented by microorganisms and coral development within each biotope. Distinct and consistent differences may occur which might be divided into smaller ecological facies. There is considerable biological diversity in each of the three archaeological zones.

Personal communications with Barry Smith at the UOG Marine Lab suggests that the 20 ft and 40 ft underwater terraces reported off the west Cocos Barrier reef are the same upper two terraces recorded in the Pilar study. Smith has indicated there at least two deeper terraces off Cocos, occurring at around 60 ft and 80 ft. Continued survey efforts near the Pilar site need to be carried out on deeper terraces observed

around 80 ft and 150 ft.

4.8 WRECKING PROCESS RESEARCH QUESTIONS.

The objective of the underwater work conducted in Zones I and II is to test the hypothesis that the rock ballast and certain groups of shipwreck artifacts are not distributed evenly across the site. The research goal is to examine the relationships among particular groups of artifacts found associated with rock ballast in order to demonstrate the nonrandom nature of the artifact scatter patterns. Each ballast concentration and artifact cluster is being designated and mapped as a "locus" reflecting the wrecking process as Pilar gradually broke up and sank in progressive stages.

Archaeological distribution maps plotting the horizontal and stratigraphic spread of artifacts associated with rock ballast are being compiled in order to answer a number of questions :

1. Are particular types of artifacts found associated with one another ?
2. What do these associations say about the wrecking process ?
3. How does the ballast distribution reflect the sinking and break up of the vessel ?
4. How does the archaeological information fit with what is known about the shipwreck from archival sources ?
5. What does the overall secondary and tertiary scatter pattern tell us about the archaeological nature of the primary cultural deposits ?

A factor analysis of the excavated artifacts from the Zones I and II will be done to determine possible statistically significant correlations between different types of artifacts. Maps are being generated to show the horizontal and stratigraphic distribution of all finds in solution holes across this area of the site. The results should define distinct artifact associations. By using the contextual data recovered from these excavations and comparing it with known artifact scatter patterns from other galleon sites, clear projections can be made about the location and nature of the main archaeological zone.

ARCHAEOLOGICAL ZONES	NATURE OF INFORMATION	DEPOSIT
PRIMARY	Composition/placement in bottom hull of vessel.	Intact and stratified.
SECONDARY	Wrecking process.	Derived and scattered.
TERTIARY	Environmental dispersal	Derived and scattered.

4.9 PHASE II - EXCAVATION AND ARTIFACT STABILIZATION.

At the beginning of Phase II many artifacts will have been identified and mapped by a pre-disturbance survey. Before any artifacts are recovered, artifact stabilization

facilities established in Phase IA will be expanded to adequately deal with the artifacts recovered in excavation operations. The excavation and recovery of artifacts will be undertaken by an airlift and venturi water dredge equipped with a fine mesh tray. All digging procedures will be supervised by diving archaeologists well experienced in dealing with 17th Century wooden hull structures and cultural material. All artifacts will be documented in-situ using standardized archaeological data forms which will be completed prior to their recovery (see Appendix E). Each boat captain will keep a full record of each day's activities. Archaeological assistants will work with project archaeologists to record bottom artifact provenience using base line offsets, trilaterations, grids and photogrammetry. Artifact data forms will be completed under the supervision of the Archaeological Director. All artifact data forms will go to the SHPO at the end of each month as part of the periodic reports. Stabilization artifact data forms will be completed by the conservator as artifacts arrive in the lab/storage facility (*Dorrell*, 1989).

Conservation processes may involve preparation of the artifacts in situ before they are raised ; first-aid treatment to stabilize their conditions on exposure to air and finally, detailed laboratory treatment to preserve them (See *Hamilton*, 1976; *Pearson*, 1987). Depending on the nature of the material being treated, the processes used may vary from simple and short treatments to procedures using electrolysis or complex chemical treatments (*NTHP*, 1987).

Artifact stabilization is a task for well-trained professionals and will require a well equipped conservation laboratory with facilities to handle all the materials which will be encountered on the wreck site. Lab facilities have been leased from Roberto S. Cruz at 470 West Soledad Avenue in Agana. This will provide adequate and secure lab space for the initial phase of the project. A larger facility will be acquired when it becomes necessary. This stage of the project will also be ideal for University assistance. The time estimate for Phase II is difficult depending on the conditions of the wrecksite, (scatter, overburden etc). A minimum of 2 to 3 years is envisaged.

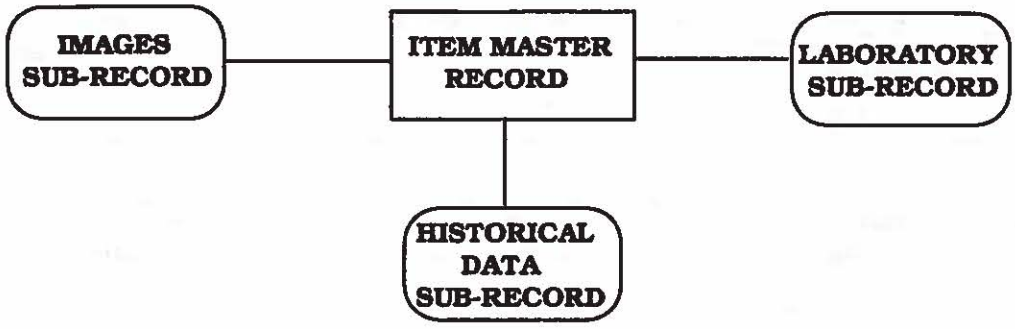
4.10 RECORD COMPUTERIZATION.

A Macintosh II CI has been obtained to computerize project data. This system contains five megabytes of RAM ; 105 megabytes of hard disk ; a laser printer ; color scanner ; and color VDU suitable for CAD/CAM processing. The CAD system will be used for three dimensional architectural line drawings, site plans, wrecksite reconstruction and magnetometer anomaly scatter patterns (*Coleman*, 1987).

All artifact descriptive and contextual data taken from the site and laboratory forms will be computerized into coded inventories to provide a comprehensive cross-indexed record of all excavated objects (*Richards and Ryan*, 1985). The system will also include word-processing and desk top publishing capabilities which will be used for report production and other similar tasks. The computer will also be used to compile and store project administrative records. See Appendix E for the computer data forms which will be used to record data on site and in the Lab. A Flow Chart demonstrating the recording process for artifacts is shown on page 46.

4.11 ARTIFACT INVENTORY SYSTEM (AIS).

The concept of the system is built on having a single main record for each item in the catalogue with several sub-records linked to this to cover different aspects of the laboratory treatment or information concerning the item. This may be shown diagrammatically as :



The Macintosh software we are using allows us to link as many sub-records as we like to a master record. We therefore have great flexibility available in recording data for any individual item. It is possible, for instance, to link a number of images of an item to its master record. These could be a pen and ink sketch of a similar item from another site, a color slide of the item in situ underwater, a black and white photograph of the item before conservation and a color photograph of the restored item. In designing the system, it has been decided to have a sub-record for Laboratory details, one for historical data pertaining to the item, and an images sub-record.

ITEM MASTER RECORD

The master record for each item will have the following fields :

Artifact tag number - this will identify each object. Where artifacts have been tagged as a group, they will be given an individual number that incorporates the original tag number i.e. 12345/16 is individual item no 16 in a group originally tagged as artifact no 12345.

Description - a full description of the item.

Date recovered - the dated removed from the site.

Site location - in a code which describes Site zone, area, excavation unit and spit.

Weight - weight in pounds and ounces (if applicable)

Dimensions - size in feet and inches etc (if objects are complex a sketch showing size, etc, will be included in the Images sub-record for the item).

Date to Lab - the dated moved to the Laboratory for treatment.

Date from Lab - date returned from treatment.

Current Location - row and shelf where located in the artifact storage facility; or safety deposit box number;

	or other location description (including the laboratory) as appropriate.
Date disposed of	- date the item was sold, transferred etc.
Disposal Method	- record how the item was disposed of i.e. sale, auction, donation, division to GovGaum etc.
Comments	- provision for any information of special interest which should be known about the item involved.

The master record will also have a number of titled icons on it. These will represent the images, laboratory and history sub-records which are available for the particular item. They will be accessed by placing the mouse pointer on the icon for the particular sub-record wanted and clicking the mouse button. This will cause the sub-record to be displayed. A return icon on each sub-record will bring the user back to the same master record.

IMAGES SUB-RECORD.

A video camera can be connected to the Macintosh computer, and with a suitable program, used to record digitized color images. We intend to use this capability to record images of artifacts for use in the inventory. We also have a scanner which will record black and white or color images of drawings, sketches, photographs etc and this will be used as another input device for images.

Where we have many examples of common items such as musket balls or ships nails etc, we will record one representative image only for these and link all master records to the one image. However, if a particular common item has some special marking or feature which warrants it, then we will record an image of this particular item.

The software has no limitation on the number of images that may be linked to one master record. This is a feature that gives us a large degree of flexibility. It would be possible with any special and significant objects, to link images of other similar artifacts from comparative assemblages to assist in the study of these items.

We also intend to make highly detailed drawings of any items of particular significance using the AutoCAD system we are purchasing. While this system is intended primarily for Project mapping tasks, it does have the ability to produce highly detailed, three-dimensional engineering drawings. This feature will enable us to graphically record our most significant items, call up an item's image on a large color screen and rotate it through three dimensions. The system can also print such a drawing on a color plotter.

LABORATORY SUB-RECORD.

This will record some of the most important information held about Project artifacts. The Lab record will record full details of all treatment a particular artifact receives to stabilize, conserve and restore it including any first aid treatment given onsite to allow its recovery. Apart from date and dimension fields, the laboratory record will be free format, to allow the technicians maximum flexibility in recording

the details of the large number of different processes used in the treatment of a variety of artifacts.

The sub-record will not be limited to one card per master record. As with the images sub-record, there is no limitation on the number of laboratory cards which may be linked to one master record. If necessary, a number of lab cards may be needed for one master record if the item concerned goes through a number of involved and complex conservation processes. However, the software we have chosen to record our inventory gives us the flexibility to handle such situations.

HISTORY SUB-RECORD.

The final sub-record which will be part of the artifact inventory is a History Card. The purpose of this is to record historical data which is particularly linked to the inventory item. It will essentially be in a format which has the following fields :

Date - the date the remarks were raised against the item.

Reference - book and page number, archives and legajo, publication data etc.

Comment - description of the historical aspect which is relevant to the artifact.

As with the other sub-records, we are able to raise more than one history card for any particular artifact where this is necessary. In addition, we could link an image of the historical reference concerned, by scanning the part of the relevant document , if this was thought desirable.

PROJECT PHOTOGRAPHIC REGISTER.

This has been set to control and record data on all photography generated by the Project. An example cards from the Register is in Appendix E. A register record is raised for each photograph, color slide or video tape which is given a catalogue number. Each item is marked with its number, date, copyright data and is stored in number order.

The register card for each item has the following fields :

Number - six digit catalogue number prefixed with the year for quick reference to the year the shot was taken.

Date - date the item was shot.

Photo Type - records if the item is a slide, print, video etc.

Category - describes the project activity or if the shot is of an historic site, project venue etc.

Site Co-ordinates
- records the site location in format : zone/area/ excavation unit/spit if necessary.

Caption - gives a highly detailed description of what the item depicts.

Technical data - describes the type of camera, lenses, lighting, film and settings used to produce the image.

Photographer - names the photographer who took the item.

Comment - used to record any information which may be needed about the particular shot (i.e. date and number of copies made and who they were distributed to, etc).

The retrieval features of the software used to record the Photo Register allow for each record to be accessed by its catalogue number or by any word or phrase used on the card. Therefore, we are able to recall photography by project activity, by site location, by date, by people named in captions, and by historic site. This has been put in operation for all photography taken since the Project commenced in early January 1991 and is working well.

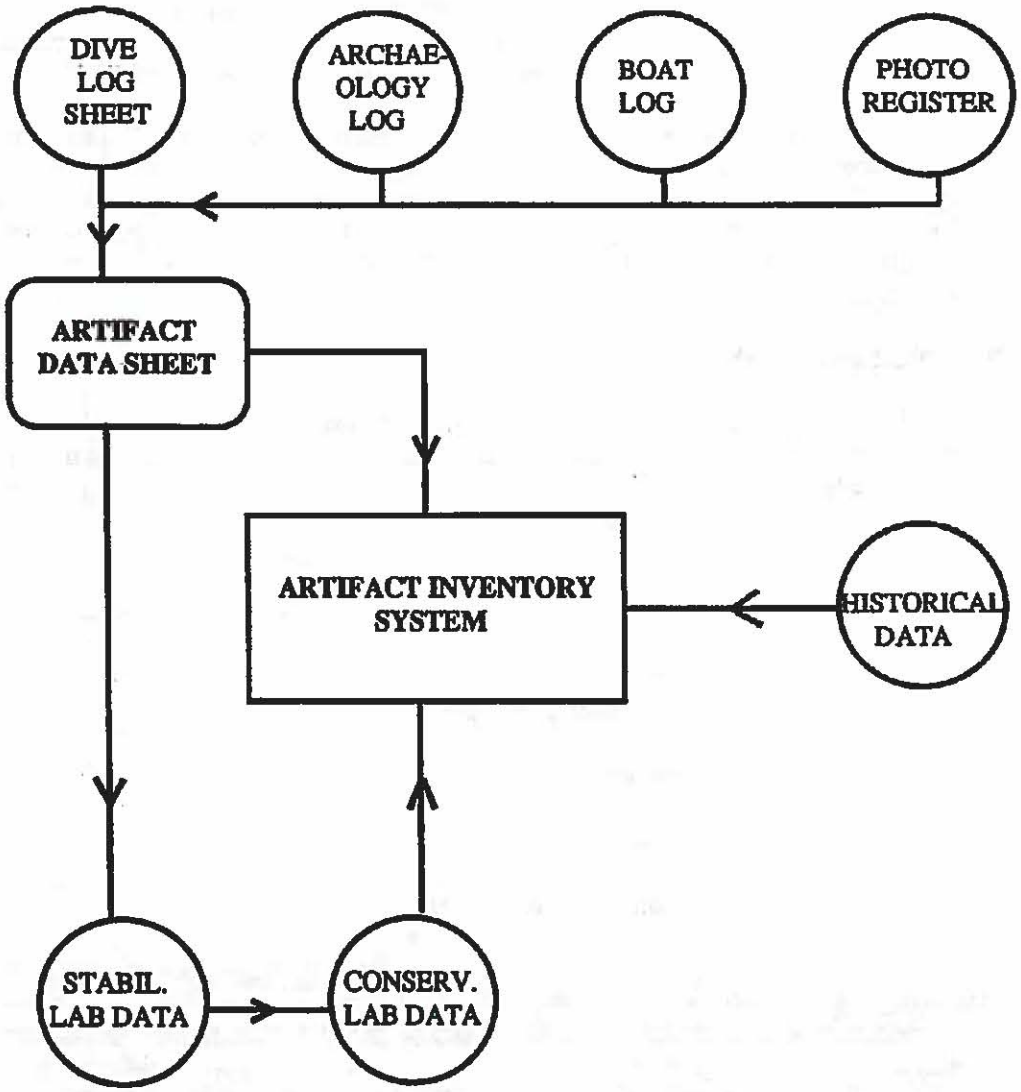
PROJECT DATA FORMS.

Examples of the Project data forms, to be used during fieldwork and in the laboratory to collect the raw data for input to the computer, are contained in Appendix E. These include :

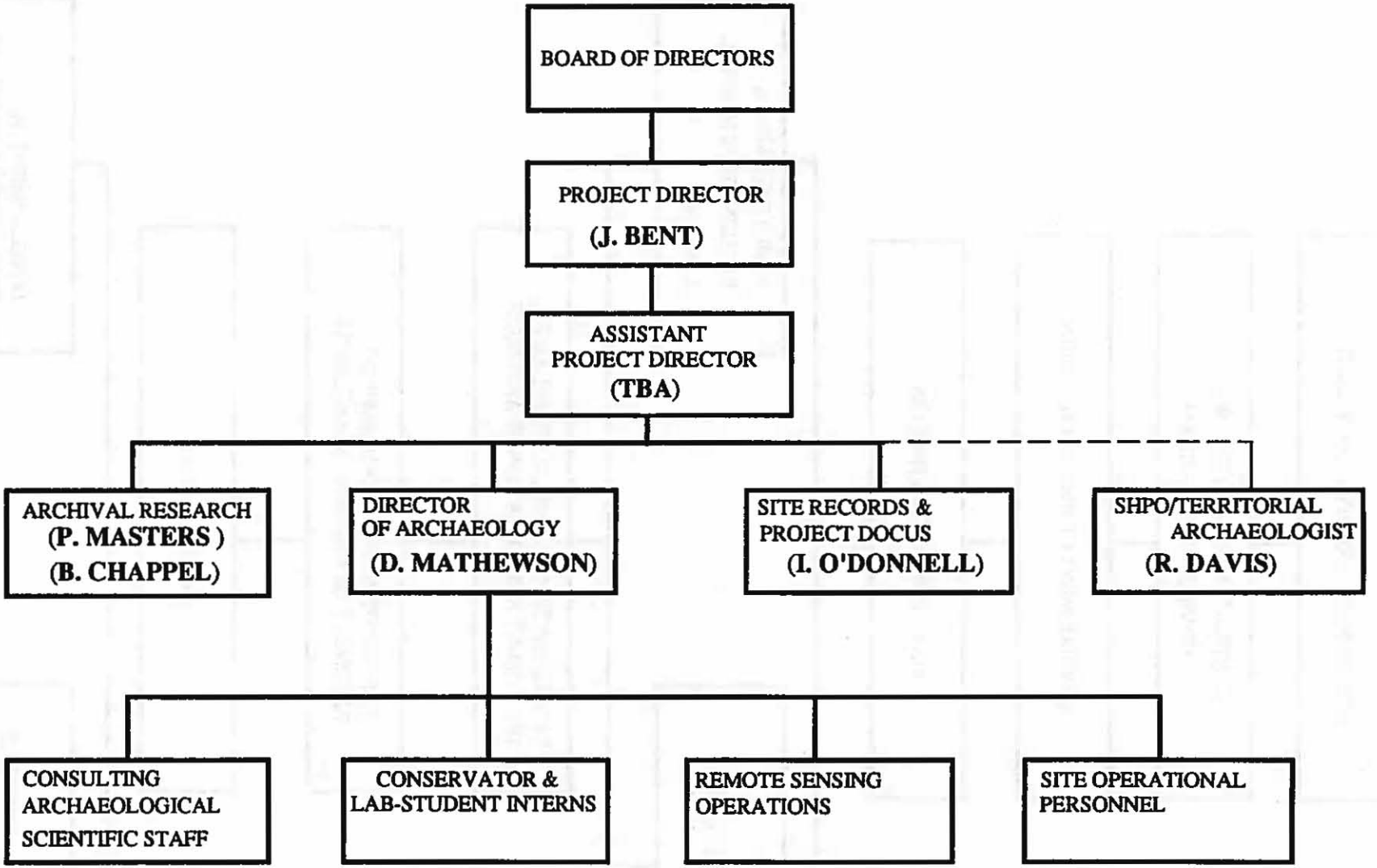
1. Daily Boat Log.
2. Dive Log.
3. Archaeological Log.
4. Artifact Data Sheet.
5. Stabilization Lab Sheet.
6. Conservation Lab Sheet.

The raw data will be consolidated from various Project sources and entered into the system daily from the above data sheets, or as needed for items being processed in the laboratory. There will also be input to the master inventory from research sources as information is gathered from various archives and historical document libraries by contract researches. The exact nature of this is hard to quantify so each case will be treated individually. A diagram of the data inputs is on page 40.

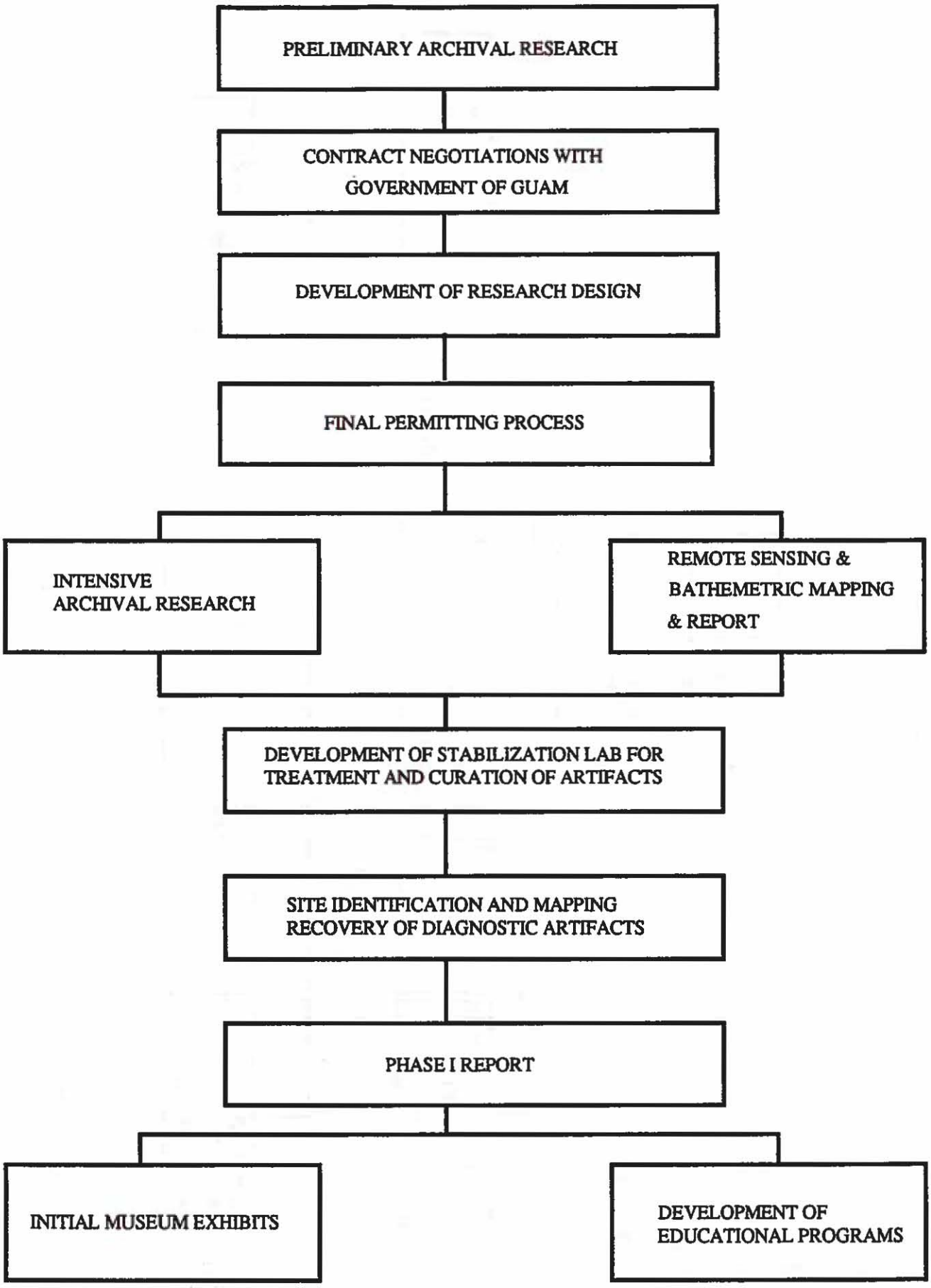
PROJECT DATA FLOW



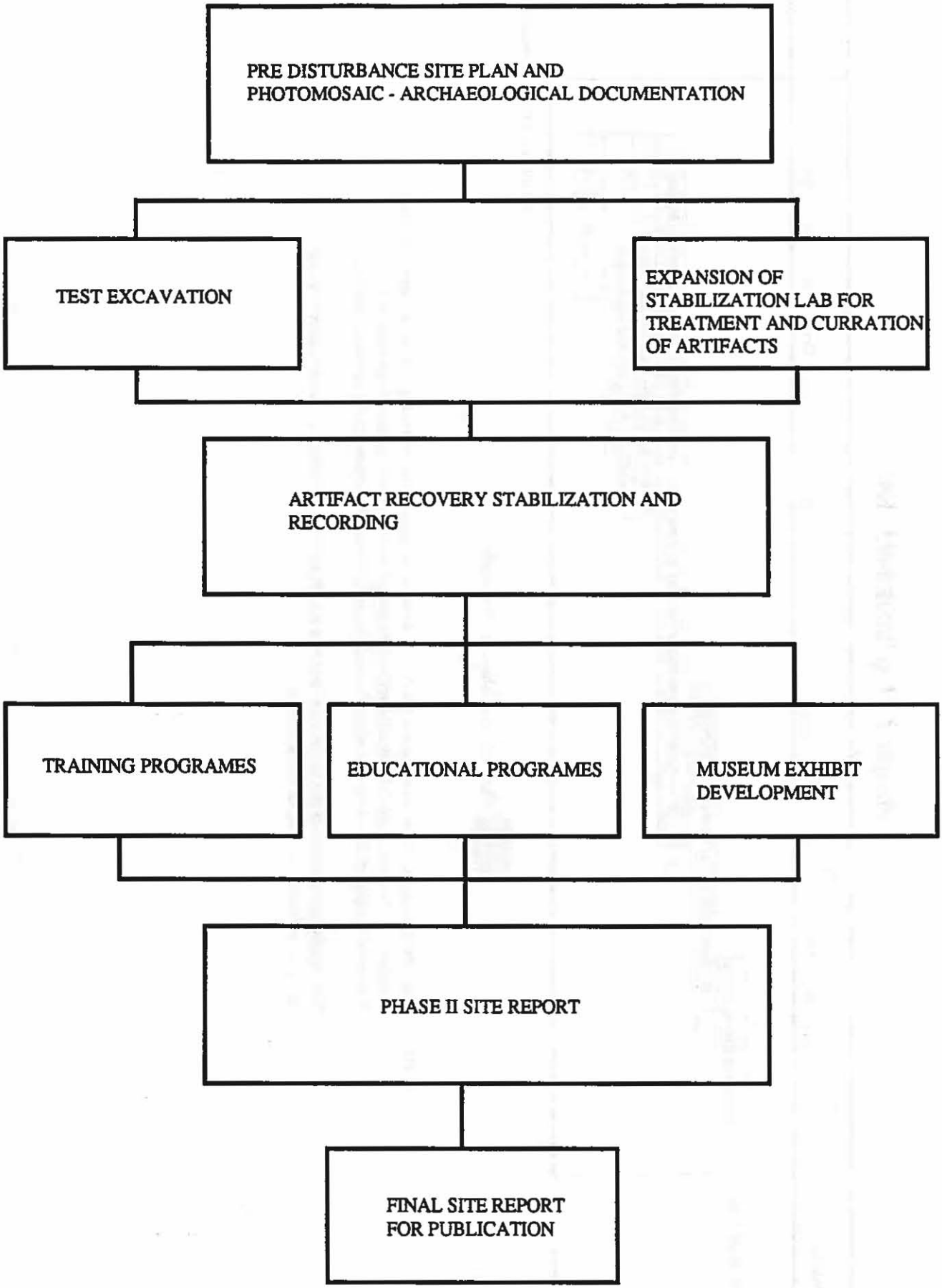
4.12 PROJECT ORGANIZATION CHART



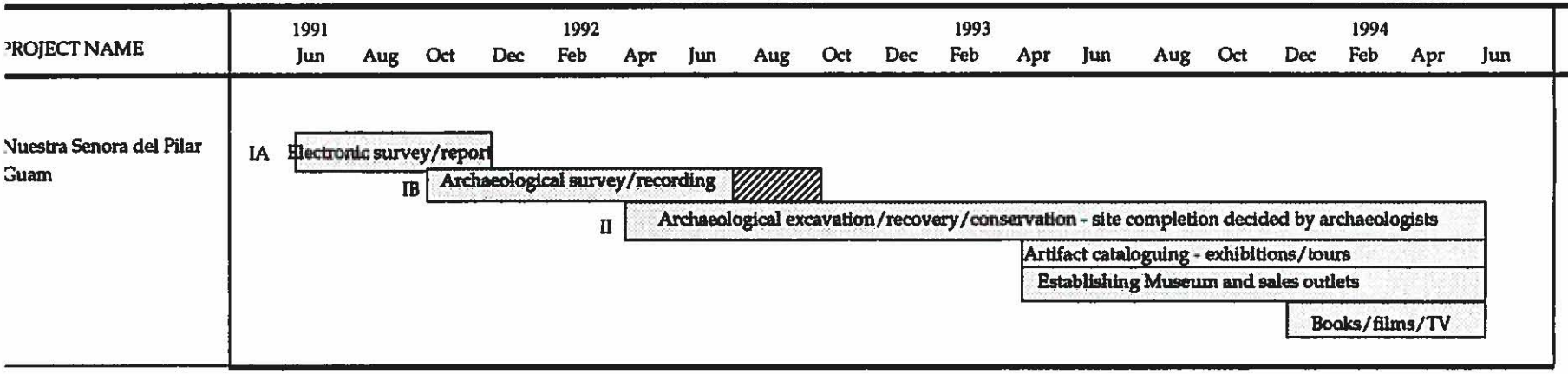
4.13 PHASE I - SCHEMATIC OPERATIONAL PLAN



4.14 PHASE II - SCHEMATIC OPERATIONAL PLAN



PROJECT TIME LINE 1991 - 1994



Could take 5 years to complete

Optional Time Extensions (if needed)

NOTES : **RESEARCH** is of paramount importance to the Pilar project and the organisation will set up a research centre. It is a vital component to the direction and historical integrity of the project and is essential to identify material recovered. A financial component for continuous research operations and collations is included in the operations budget.

The organisation also expects that the research data base it will establish will become a reference source for any group or individual working on Pacific history.

ARCHAEOLOGICAL - ENVIRONMENTAL SHIPWRECK MODEL

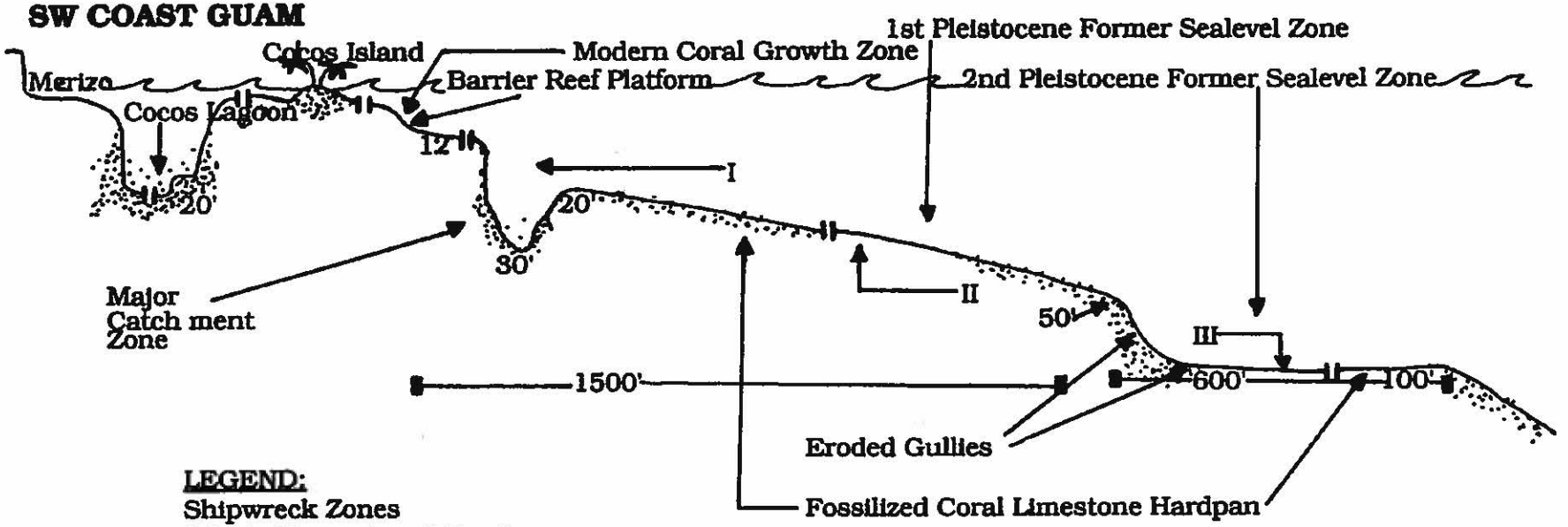
(After Mathewson, 1991)

Cultural Deposits	Nature of Deposits	Mapping Procedures	Ship Board Activity Data	Wrecking Process Data
(I) Primary	Artifact assemblage stabilized by rock ballast, hull structure, underlying over-burden. In-situ artifacts provide non-random distributiuon pattern reflecting human behavior in different shipboard activity areas.	Contextual artifact provenience determined by grid mapping, artifact trilateration, photo mosaic, video recording, individual artifact recording.	Excellent	Excellent
(II) Secondary	Scattered artifact deposition derived from the break-up of vessels following their sinking and progressive break-up under prevailing local hydrological conditions. Precise contextual data is unavailable but useful relative spatial relationships can be determined. Some random associations can be determined for certain categories.	Contextual artifact provenience determined by base line surveys, artifact cluster recording.	Marginal	Good
(III) Tertiary	Continual artifact redeposition in shallow in-shore waters by storms and long-shore currents. Environmental conditions produce random distribution pattern.	Contextual artifact provenience determined by base line surveys, artifact clusters recording.	Poor to non existent	Marginal

Primary Deposits :	In-situ artifacts directly associated with wooden hull structures, major rock ballast concentrations, and/or cannon and anchors marking the original position of the shipwreck.
Secondary Deposits :	Derived artifacts, transported by near off-shore oceanographic variables (wind, waves, & currents) within a short time following the sinking of the vessel.
Tertiary Deposits :	Derived artifacts which are continually redeposited in the normal erosion-sedimentation cycle of coastal geological processes.

PILAR PROJECT
GENERAL DIAGRAMMATIC CROSS SECTION
MERIZO TO COCOS ISLAND
SW COAST GUAM

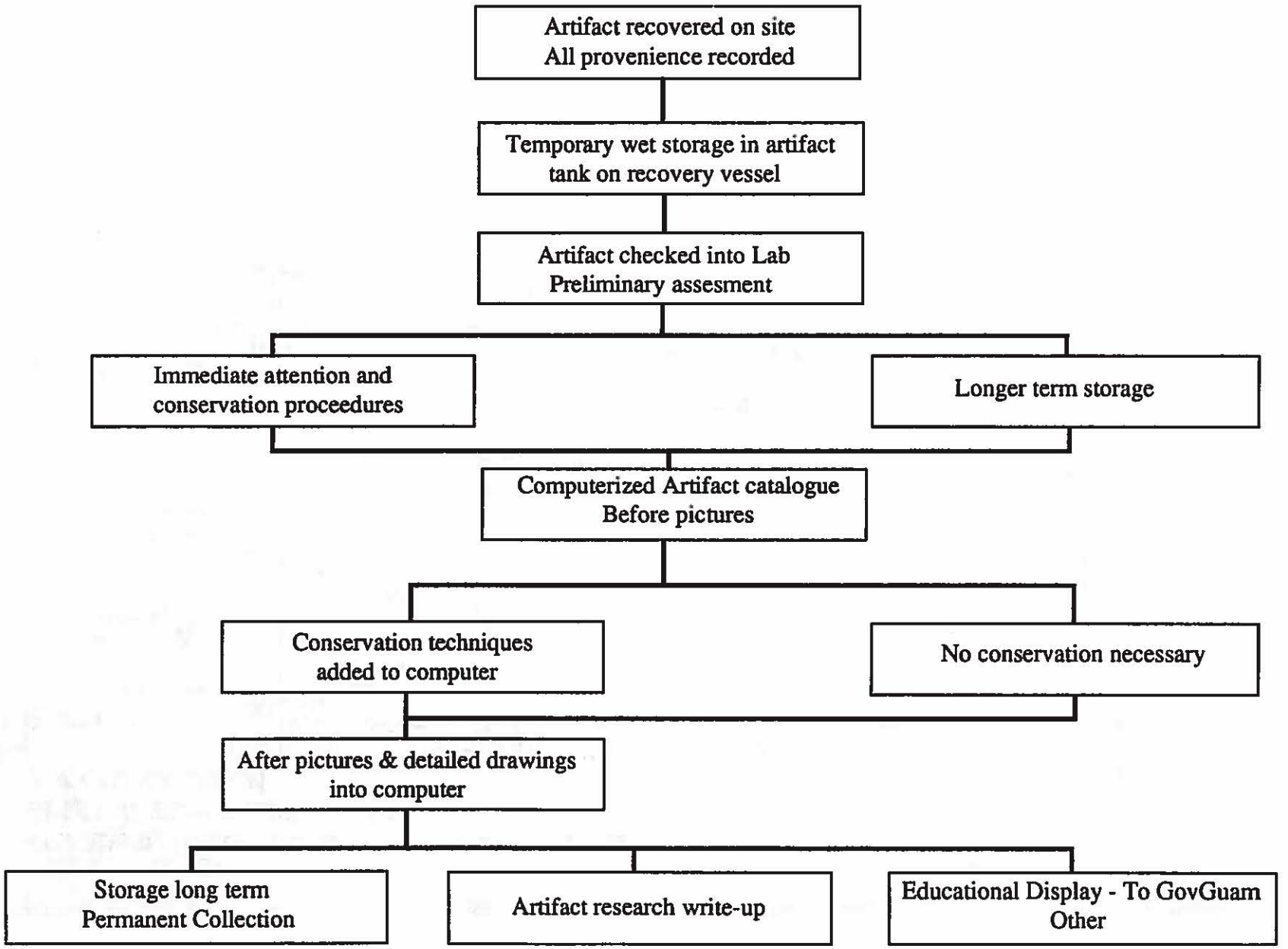
(not to scale)



LEGEND:
Shipwreck Zones
I) Initial Impact and Break-up.
II) Secondary Break-up and Stabilization.
III) Tertiary Scatter.

J.E. 8/8/91

4.15 PILAR PROJECT ARTIFACT FLOW CHART



5.0 RESEARCH CONCERNS

5.1 INTRODUCTION.

Human migration and settlement in the Pacific has long been a matter of great historical interest. It has fascinated and inspired debate among scholars and laymen alike ever since Magellan's first landfall on Guam in 1521 (*Bellwood*, 1982). Many theoretical and practical issues have been discussed through the years by archaeologists, ethnologists and linguists who have attempted to solve many of the mysteries involving the people of the Pacific (See *Holmes*, 1981).

Although much still needs to be learned about the trans-Pacific migrations through Melanesia, Micronesia and Polynesia, one thing has become very clear: a sophisticated maritime technology was essential before the indigenous peoples of Oceania could have reached out to the many corners of the world's largest ocean. Navigating over vast distances necessitated a unique knowledge of watercraft, winds and currents never achieved to such an extent by pre-industrial society (See *Finney*, 1979).

Much is known about the manner in which the native peoples of the Pacific adapted their cultures to the maritime environment surrounding them. Their skill as ancient mariners has been well documented by scholars who carefully have studied different aspects of their cultural history (*Hornell*, 1936).

But comparatively little anthropologically is known about the early European exploration and maritime voyages in the Pacific over 250 years before Captain Cook's first voyage of discovery. We know more about the maritime cultures of Island peoples than we do of the European seafarers who followed them. (See *Clune* 1977 :and *King and Parker* 1984).

Apart from the cultural tidbits gleaned from written records scattered in different archives around the world, relatively little anthropological information has been compiled about early European voyaging across the Pacific (*Cutler*, 1930 ; *Lubbock*, 1933, 1946). Marine archaeological fieldwork and research on the physical remnants of this maritime enterprise - namely the ships used by European seafarers constitutes a major new sub-discipline of anthropology which has only just begun to be developed in Pacific Rim countries.

The cultural meaning of the maritime system of the "Manila galleon" which dominated commercial trade between the Orient and the Americas from 1565 to 1815 is little understood. The historical framework provided on the Manila galleon by Duro (1893), Schurz (1939) and a few others have produced an invaluable backdrop from which to view cultural adaptations European seafarers had to make in order to successfully adjust to life under canvas for months at a time (See *Phillips*, 1986).

Many questions about the Manila galleon might be posed about the cultural and technological adaptations which were necessary to make annual 8000 mile trans-Pacific crossings between Manila in the Philippines and Acapulco on the west coast of Mexico. Now that scientific archaeological techniques are available to carefully excavate underwater shipwreck remains, a whole new avenue of research has opened up. Nowhere is there a better opportunity to investigate the cultural meaning of the Manila galleon trade than on the submerged remains of Nuestra Senora del Pilar .

The scientific excavation of this shipwreck will be focused on answering four general questions concerning the Pilar in an effort to learn more about Manila galleons and the Pacific trade :

1. What ship building techniques and maritime technology

were necessary for successful trans-Pacific voyages?

2. What cultural adaptations were made to adjust to life under sail for months at a time?

3. What cultural effect did the shipwreck have on the indigenous Chamorro communities?

4. What possible commercial impact did the loss of the vessel have on the Spanish and Chinese economies ?

5.2 HISTORICAL SIGNIFICANCE

The wreck of the Pilar has a very considerable historical significance. The investigation of its remains will be the first time scientific excavations have examined a westwards sailing Manila galleon. The only other such shipwreck, which has been examined is the Concepcion which went down in 1638 off Saipan on an eastwards crossing from Manila to Acapulco. The work in 1988, carried out by Bill Mathers has successfully recovered a tantalizing artifact assemblage which provides a glimpse of what a Manila galleon can provide in terms of historical and cultural insights of this period. Archaeological data and operational details about the Concepcion project are at present unavailable. Discussions with Mathers and his crew members as well as a review of artifact photographs and line drawings suggests a wide range of artifacts particularly ceramics and jewelry. The only published account of this site to date appears in National Geographic Magazine, September 1990. Archaeological data from the Pilar site will be used to compare with the Concepcion site in an effort to explain the different events surrounding the sinking of these two galleons and the effect on trade pattern difference between Eastward and Westward sailing galleons.

The broad historical significance of the Pilar can only be measured in term of the Spanish penetration of the Pacific and the economic impact that had on global trade and economic development (*Braudel*, 1981; *Curtis*, 1984).

An effort will be made to determine how accurate the historical accounts about the Pilar are in comparisons to the archaeological data recorded from the physical remains on the site. A major research objective is to investigate the cultural relationships between European ships arriving in Guam and the indigenous Chamorro communities. A shipwreck off Pago Bay is thought by Bob Marx to be that of the Manila Galleon, Nuestra Senora de Buen Viaje, lost in 1754. A local Catholic church has a similar name which is remembered by an annual festival put on each year by the church. Does this represent an earlier association between this assumed shipwreck and the local catholic community known to have existed in Pago Bay around 1750? The existence of Buen Viaje off Pago Bay still needs to be confirmed as no documentation has ever come to light to verify this claim. Research by Marjorie G. Driver indicates that the site is a three masted brigantine which sank in a typhoon on 14 November, 1860. The site is known to have been salvaged shortly after its sinking. More recently scattered finds are reported to have been recovered over the years in modern salvage efforts and along the beach, particularly after bad storms.

One of the most interesting research aspects of this project will be the comparisons of archaeological data against the historical backdrop concerning the relationship of the Manila Galleon trade and the local Guam community researched by Marjorie G. Driver during the years from 1674 - 1694 (*Driver, 1990*). Professor Driver's research efforts at MARC have provided invaluable information on this period of Guam's history including an account of the Pilar sinking. Driver's archival evidence has indicated that several different types of cargo traditionally brought to Guam by Manila Galleons :

Situado : Funds drawn as a subsidy from the Viceregal Treasury of Mexico which was shipped in the form of silver currency or clothing. These funds comprised the salaries for the sargento mayor, governor adelantado and commandant of the Presidio, payroll for the infantry and the missionary stipends.

Socorro : In addition to the monetary support an allotment of everyday necessities such as soap, wine, flour, tools, textiles, thread and cording, copper and steel sheeting, iron, domestic animals, seeds etc went to the soldiers and missionaries. Every day items of a personal, religious and teaching nature were far more important to the activities of the Jesuit missionaries than the currency.

Boletos : Cargo bundles were placed on board for eligible Spaniards wishing to ship their personal belongings. This cargo space, allocated and sold in Manila for 125 pesos, could bring a total value of 1500 to 2000 pesos in trade. Spanish born sons (Peninsulores) and their American born cousins (Criollos) sailing as affluent, well-placed government or religious officials, military officers, civil servants, or ordinary soldiers, settlers and merchants all acquired as much of their own cargo spaces as possible to seek as great a profit as they could within the well established galleon trade system.

Archaeological documentation of these different types of cargo will flesh out the archival evidence previously compiled by Majorie G. Driver and complemented by over 600 pages of documentation concerning the contents of the Pilar located in the Archives of the Indies. (See Appendix F) Detailed lists of ships tools and supplies, military supplies, religious equipment, medicine chest contents and food provisions along with 91 names of the sailing crew provides an invaluable background from which to interpret archaeological remains found on the seabed. Not only will this interdisciplinary study of the Pilar artifacts provide invaluable new anthropological and historical insights into this period of Chamorro history, but it will also represent a good test of archaeological methodology involving historical period sites (See *Repetti*, 1941,1971).

The archaeological research of the Pilar wreck will specifically focus on five major components of the site :

1. the hull, rigging and associated architectural features ;

2. the rock ballast ;

3. the vessel's supplies, equipment and armaments ;

4. the cargo ; and

5. the personal possessions of the crew and passengers.

The physical integrity of the shipwreck remains and the overall distribution of the cultural material on the seabed will greatly influence how much artifactual data can be recovered (See *Green*, 1973,1975; *Wilkes*, 1971). Judging from what is known about the events surrounding the sinking of the vessel and the environmental conditions of the suspected site location, it is anticipated that the main part of the shipwreck could be relatively well preserved beneath 60 foot water depths.

After slipping off Cocos reef, Pilar filled with water and sank with the lower hull still virtually intact. She settled into 25-30 feet of water where the vessel's remains were most probably destroyed by the first typhoons to occur after she sank. Hollows in the coral hard pan filled with sand and coral rubble would have tended to preserve buried metallic and ceramic remains. While several major typhoons, starting in 1693,

and an earthquake should have caused severe damage to the sunken hull structure, it is possible that some of the lower hull with the keel, keelson, floors and lower frames up to the turn of the bilge might still be articulated together with much of the vessel's heavy cargo and supplies packed on top of rock ballast. However, as the site is in such a high energy zone it is problematical that any significant hull fragments would have survived. The survival of the upper superstructure of the vessel with its associated personal effects of the ship's officers, crew and passengers is not considered a high probability (See *Mathewson*, 1977,1986).

5.3 HISTORICAL SALVAGE ACCOUNTS

Contemporary accounts of salvage activities on sunken vessels in antiquity can provide important clues about the vessel not obtainable elsewhere (*Lyon*, 1976). They provide first hand information concerning the location and layout of the wrecks. This usually is the best source for hydrographic information such as water depth, currents, tides and overburden necessary to reconstruct the events surrounding the sinking and break-up of the vessel. First hand accounts of past salvage activities also provide a general picture of what passengers and cargo were on board at the time of the sinking. This information is particularly important when there is no documented manifest or ship's papers (*Mathewson*, 1981,1991).

By comparing the lists of salvaged material against the known manifest of a treasure galleon, a good idea can be obtained of how much royal and private cargo was recovered, and how much artifactual material remains on the site. Anchors, cannon and other ship supplies recorded in the salvage accounts can also be compared to what was known to have been aboard as listed in subsidiary documentation such as ship's papers, contracts and law suits. However, salvage accounts are not much help in estimating how much contraband and personal effects might remain on a wrecksite centuries after its sinking. As these items were either smuggled on board the vessel or packed among the private possessions of the crew and passengers, no official records exist making it impossible to know the content of the material involved.

A close comparison between archaeological evidence and historical documentation suggests that the amount of contraband on Spanish galleons during the 17th century might run as high as 19% of the total official cargo being shipped (*Lyon*, 1976). In the case of both 1622 Spanish treasure galleons, Nuestra Senora de Atocha and Santa Margarita, archaeological evidence when compared to historical documentation clearly indicated several things (see Fig 1 & Fig 2 below).

1. The majority of the gold bars, bits, discs and chain found on both 1622 sites was contraband. As very little was listed on the manifest it is impossible to know how much remains on the sites.

2. The loose emeralds were also clearly smuggled onboard. The high grade muzo stones were hidden in the personal effects of the senior ship's officers and affluent passengers quartered in the stern castle, while the low grade light colored emeralds were all found up forward in the fore castle area where junior officers and crew were accommodated. As with all contraband it is impossible to know how many of these or different grades of emeralds remain on the Atocha site.

3. The official accounts of the 1626-31 salvage activities on the Santa Margarita site indicate that 19% of the 401 silver ingots recovered were not registered on the manifest. Modern salvage has produced a good number of contraband silver ingots.

4. Silver coins were smuggled aboard in great quantity.

5. Personal jewelry was not required to be listed on the ship's manifest although silver plate was.

6. Although gold coins were not listed on the ships' manifests, 171 were recovered. These coins were from the personal effects of the passengers and senior ships officers.

FIG 1 - ATOCHA RECOVERIES

	Recorded Items	Salvaged in Antiquity	Modern Salvage	Estimated Remaining
Silver Coins	155,875	c3,000	161,863	?
	Recorded Items	**Salvaged in Antiquity**	**Modern Salvage**	**Estimated Remaining**
Silver Ingots	1,038	2	969	67
Gold Bullion	125 pieces weighing 3588 Troy oz.	0	164	?
Gold Chain	2	0	43	?
Gold Coins	0	0	111	8
Emeralds (Muzo)	0	0	886	?
Emeralds (Lt)	0	0	1545	?
Copper Ingots	582	0	619	?
Bronze Cannon	20	0	10	10
Anchors	6	0	3	3

Note : The estimation of remaining material excludes 19% contraband.

FIG 2 - SANTA MARGARITA RECOVERIES

	Recorded Items	Salvaged in Antiquity	Modern Salvage	Estimated Remaining
Silver Coins	123,274	72,305	13,845	37,124
Silver Ingots	493	401	18	74
Silver Biscuits	0	0	4	?
Gold Bullion	34 pieces weighing 1,488 Troy oz.	12	63	?
Gold Chain	0	0	50	?
Gold Coins	0	0	60	8
Copper Ingots	199	146	31	22
Bronze Cannon	18	12	2	4
Anchors	6	1	5	0

Note : The estimation of remaining material excludes 19% contraband.

Although the large galleons of the treasure fleets such as the Capitana and Almiranta were known to carry the Royal treasure, it was not uncommon for other smaller vessels to carry the King's gold and silver cargo as well. The site that has produced the most gold artifacts from the 1715 Spanish Plate fleet off the Florida coast is the widely scattered remains of a small New Spain vessel believed to be the Patache, Nuestra Senora de las Nieves (*Mathewson*, 1984). The cargo manifests only indicated that she carried 44,000 pesos in coined silver with no mention at all of gold cargo. Yet over 5,000 gold coins of the Royal treasure have been recovered. Although a Patache

was a small reconnaissance vessel used as a fleet tender, they were considered usually the most maneuverable ships afloat and could easily transport large quantities of valuable cargo. While the 1715 Tierra Firme manifests are incomplete, 83,290 pesos de oro were officially listed as being loaded onto 3 of the six vessels which have been archaeologically identified. This is equivalent to about 13,515 avoirdupois ounces of gold. It is not known from the manifest how much gold was being smuggled on these vessels or how much was being carried by the other ships in the fleet. Smuggled gold no doubt could have been found anywhere secretly hidden in any of these ships. Salvage records of the material recovered in 1716 off the Capitana of the Tierra Firme ships indicated a box marked as pharmaceutical supplies yielded contraband gold amounting to 14 gold discs, 10 gold pieces, 3 gold chains and 720 doubloons.

When reviewing contemporary salvage concerning the Pilar site, it is important to keep several things in mind. Salvage efforts were almost always concentrated on first rescuing the Royal treasure being shipped for the King. A close second was the private treasure and the ship's guns, particularly if they were made of bronze. Bronze guns belonging to the King were always highly prized. Iron cannon and anchors were also given high priority in any salvage effort. Relatively little time was spent on recovering the type of material archaeologists are interested in using to reconstruct the cultural history of a site. Shipwrecks reported to have been salvaged in antiquity still contain a large amount of material of great archaeological interest. (*Mathewson, Nd - 1*).

Early salvage efforts undertaken centuries ago were usually not very effective in recovering heavy cargo from the orlop deck in the lower hull once it filled with water. The bulk of the material was salvaged by free divers. No matter what experience free divers had breath holding, there were always serious problems in recovering goods in conditions where currents and bad visibility made diving beyond 40 feet marginal at best. Such depths, even if the free divers were very experienced, made practical salvage almost impossible (*Mathewson*, Nd 2).

Written accounts of early salvage efforts must be carefully evaluated as a true report of what was actually recovered. Contemporary accounts may have been exaggerated to satisfy Government officials, particularly where they were answerable to the King for the recovery of Royal treasure and shipboard artillery. On the other hand, corrupt officials would tend to under report what was recovered so that they could keep as much as they could for themselves.

5.4 ARCHAEOLOGICAL METHODOLOGY

The following guidelines summarize the methods and techniques which will guide the scientific underwater excavation and artifact mapping in all phases of the operation. When a SHARP mapping unit is deployed, electronic mapping points will be recorded by the Trisponders. (See Appendix B) The artifact lab will be prepared to stabilize cultural material by the end of Phase I. Underwater mapping data points will provide a frame of reference for gridding off the entire site. Base-line offsets, trilateration, photo grid mapping and video mosaics will provide provenience data including stratigraphic and sedimentary data.

1. SITE SURVEY. Survey operators will establish a means of plotting and charting clusters of submerged cultural material to establish and record the location of all finds. The datum point of the site survey will be fixed with a Global Positioning System (See Appendix B). Detailed mapping within the site will then be done with the SHARPS system which theoretically plots locations to an accuracy of 0.2 meters. Beach Marker Datums/Position Finding Transmit stations or electronic positioning equipment will be established as required.

2. DATA RECORDS. Each boat captain will be responsible to perform the

following tasks :

a. Determine the position of the boat with the GPS,

b. Plot the resulting readings on a base map.

c. Use a standard coordinate system to record and describe location of artifacts and bottom features.

d. Use a numbered artifact tagging system which will allow identification and provenience of all recovered artifacts to be maintained.

e. Use a log book system which will provide an accurate record of boat location, operational activities and artifacts recovered by tag number and location together with other useful information.

The Archaeological Director and the Side-scan and Magnetometer Operators will conduct a workshop at the beginning of the survey operations to instruct crew members in these tasks and will be further available throughout the project season to instruct new personnel as required.

3. RECORDING OF SURVEY AREAS. All survey areas will be mapped by electronic position finding equipment. To ensure accuracy of recording search area locations, survey boats are to operate their GPS systems in continuous mode. This will cause the equipment to update its position every 3 seconds so that the boats current position fix will be shown at all times. Search area feature identification will be recorded on large scale base maps and will be identified with a unique two letter abbreviation of the boat's name followed by consecutive numbers for each search area beginning at the start of the season and concluding at the end of the season.

In the log, brief description and tag numbers of all artifacts recovered will be recorded for each search area so that the tag number is sufficient to determine the provenience of any artifact. Representative and all unusual search area profiles will be recorded noting the general order and thickness of recognizable sediments and the location of artifacts or other useful information. Any interpretations of stratification or association which might be useful in understanding the process of artifact scatter and deposition will be noted.

A Global Positioning System (GPS) is being used to establish specific "loci" on the site during the predisturbance remote sensing survey being conducted over a ten square mile area. The accuracy and precision of this system has been calibrated with the Coast Guard tower on Cocos Island. Readings have been found to be extremely accurate (well within ten meters within the overall ten square mile survey area). This accuracy is more than enough for a Phase I Survey. The 800 foot baseline to be fully extended to another 800 feet in the "canyon" area has been established from a datum which will be surveyed in with a theodolite to within 10cm accuracy from the Coast Guard tower on Cocos Island. The tower appears on all local maps and charts. It will be used as a temporary bench mark to tie in the 500 meter baseline on the site. All excavation units, archaeological features, and cultural deposits will be mapped in-situ by off-sets and trilateration measurements from the baseline. Grids and photo mosaic mapping frames will provide state-of-the-art U/W recording for CAD/CAM computerised 3-dimensional perspective archaeological plans and drawings.

4. LARGE NON-STRUCTURAL ARTIFACTS. Large objects like cannons and anchors will be tagged, left in place on the bottom and their location recorded so that they may serve as mapping and datum references in future work. Cannons, anchors, wood structure and other large objects will not be removed from the site unless

transfer, storage and stabilization facilities are available.

5. STRUCTURAL REMAINS AND MAJOR ARTIFACT CLUSTERS. Because structural remains and major artifact clusters have more important association than scattered material, greater care is required in recording provenience. Structural remains will be photographed where possible, and mapped at 1:50 scale on base maps to show position of wooden structural members, spikes and other artifacts as well as details of construction if visible (See *Rule*, 1989). Maps will be tied to the standard coordinate system and datums and U/W buoys marking mapping reference points on the bottom. The high energy depositional characteristics of the site make it highly unlikely that any large articulated hull structures will be found. Archaeological investigations indicate that the wooden lower hull structure has been badly broken up by the sea action and typhoons. Any wooden remains in water depths up to 60 feet are expected to be very fragmented. If large articulated hull timbers are found at deeper depths, they will be studied in-situ and no efforts will be made to recover them unless full conservation facilities and a long term preservation plan to deal with them have been developed in partnership with Gov. Guam.

6. ARTIFACT TAGGING. All artifacts removed from the seabed will be mapped in-situ and tagged before being placed in containers and/or bags. No artifacts will be recovered in Phase II until a safe, secure stabilization repository has been established on shore. All recovered artifacts will be tagged individually or as a group having the same provenience. Anchors and cannon recorded and left on the bottom will also be tagged. Tags will be plastic with permanent imprinted numbers and affixed to artifacts by copper or stainless steel wire or nylon cord.

For small or delicate artifacts the tag may be placed in the same sealed protective container as the artifact. Large objects will be individually tagged. Small finds will be individually tagged. Common occurring objects such as pottery sherds, spikes, barrel hoop fragments, musket balls or lead sheeting might be bagged as a group and assigned a single tag number if they are from the same context. Bags will be of sufficient strength that they will not tear or break in handling or rot in storage before processing. Cloth is recommended.

7. ARTIFACT HANDING. Artifacts may be divided into the following categories ; large objects, such as anchors, cannon and hull structure ; small encrusted objects (E.O.'s) ; small unidentified encrusted objects ; and identified small finds ; and unique artifacts. After tagging and recording, artifacts in each category will be treated as follows :

a. Large Objects. These will be left in situ on site until wet storage facilities are available. Once removed, they should be handled so as to minimize damage and should be kept moist. They must not be allowed to remain out of the water more than three days.

b. Encrusted Objects. All E.O's must be kept moist, while onboard and in transit to the storage and processing laboratory. Ballast stones and encrustation may be separated from E.O's if their removal will facilitate handling and not break the E.O. E.O's will not be broken open on board ; instead they will be processed on shore at the storage and laboratory facility where they can be X-rayed if necessary.

c. Small Finds. This includes such items as pottery sherds, spikes, barrel hoop fragments, musket balls and lead sheeting. These may be bagged as a group from each search area or excavation unit. If iron is included, the bags or objects will be kept moist.

d. Unique Artifacts. These will be assigned individual tags, unless they

are clusters of coins, and placed in individual small plastic bags or protective jars to prevent damage. Unique objects will be placed in a safe, secure storage area immediately following their recovery.

8. ARTIFACT PROCESSING AND STABILIZATION. All artifacts recovered from the site are to be registered immediately in the artifact processing and stabilization shore facility. This facility shall have storage and processing capability and will provide sufficient security to ensure the protection of all artifacts. In addition to the routine processing of small finds, E.O.'s and other artifacts needing stabilization, all unique artifacts will be photographed with the tag number and provenience data recorded on the back of the photo prior to the object being conveyed to a safe storage. At least two of these photographs will be prepared : one for the Project Director and one for the SHPO. Final records, artifact overlay maps and inventories of identified artifacts will be filed with the SHPO at the end of each month's excavation. Copies of all field records will be maintained at this facility during the excavation season. Log sheet copies of site operations, along with artifact photographs, will remain on file for review at any time by the SHPO.

9. ARTIFACT CONSERVATION. All fragile and unique artifacts of special interest will be given priority for conservation and/or restoration. Interesting encrusted objects should be X-rayed and preserved as soon as possible after recovery. The conservation laboratory staff and the SHPO's office will cooperate closely in establishing priorities for all stabilization and conservation activities.

10. DIVER SAFETY. Spinning shafts, high vacuum suction intakes will be caged while divers are in the water. Dive flags will be displayed and standard dive safety precautions will be followed under supervision of a Dive Master. The Dive Master will assume control of all diving activities to assure that safe procedures are followed at all times.

12. REPORTING REQUIREMENTS. Monthly reports will be made available to the SHPO. Copies of professional papers, popular articles and manuscripts resulting from data derived from excavation activities will be provided to the SHPO. Annual preliminary site reports will be prepared in order to facilitate preparation of the final site report and popular publications. Monthly reports in all phases of the operation will be viewed as preliminary reports to the final publication. They will contain among other things a complete list and description of all major finds recovered together with an overall map of their horizontal and stratigraphic distribution pattern. In-situ photographs of major clusters will also be included as part of the narrative describing the overall operation. All archaeological and historical data on the Pilar and other Guam wreck sites will be freely exchanged with the SHPO.

5.5 EXCAVATION EQUIPMENT.

Shipwreck remains will be excavated in water depths from 30 to 80 feet with air-lifting equipment and injection water dredges. The digging operations will be constantly monitored and controlled underwater within the area being excavated by a member of the archaeologist staff to insure that artifacts are not removed out of context before they are recorded. All digging operations will be undertaken in sand and rubble on top of fossilized coral hardpan formed during a Pleistocene period of lower sea level. No excavations will endanger modern day coral reef systems of benthic communities (See Figs 1, 2, 3, and 4 on pages 67 to 70).

5.6 COMPARATIVE STUDIES.

N.S. del Pilar should contribute significantly to the study of Spanish material culture of the last half of the 17th century. Deagan (1988) has provided a comprehensive cultural back drop to the Spanish colonial artifacts of Florida and the

Caribbean (1500-1800) which can be used in a comparative study. Similarly published archaeological data from other historic shipwrecks around the world will provide an invaluable temporal and cultural comparative context in which to interpret the data recovered form the Pilar site (see Table below) :

COMPARATIVE ARCHAEOLOGICAL COLLECTIONS

DATE	VESSEL	CULTURAL CONTEXT	LOCATION	PUBLICATION
1554	Santa Maria de Icior & 2 others	Spanish Treasure Flota sailing from Veracruz to Spain	Padre Island Texas coast	Arnold & Wedell, 1978 Olds, 1976
1588	Girona, Trinidad Valencera, & 4 others	Spanish Armada	Coasts of Ireland, Scotland , England.	Stenuit, 1972 Martin, 1974 Wignall, 1982 Flanagan,1988
1622	Nuestra Senora de Atocha & Santa Margarita.	Spanish Treasure Flota sailing from Havana to Spain	Florida Keys	Lyon, 1976, 1982, 1988 Mathewson, 1977,1986
1629	Batavia	VOC Dutch East Indiaman	West Coast of Australia	Green, 1975
1641	Nuestra Senora de Concepcion	Spanish galleon sailing from Mexico to Spain	North Coast of Dominican Republic	Peterson, 1979 Earle, 1980 Grissins, 1980 Borrell, 1983.
1656	Vergulde Draeck	VOC Dutch East Indiaman	West Coast of Australia	Green, 1973, 1977, 1983
1690	***N.S. del Pilar***		***Guam***	
1697	Santo Antonio da Tanna.	Portuguese galleon trading in the Indian Ocean.	Kenya Coast	Piercy, 1977, 1978.
1715	Nieves & 5 others.	Spanish Treasure Flota sailing from Havana to Spain.	East coast of Florida	Wagner & Taylor, 1966 Clausen, 1965 Skowronek, 1982 Burgess & Clausen,1982 Mathewson, 1984, 1990.
1724	Conde de Tolosa, Nuestra Senora de Guadalupe.	Spanish galleons sailing from Spain to the New World.	Northeast coast of Dominican Republic.	Borrell, 1983 Peterson, 1979
1733	El Enfante & 11 others	Spanish Treasure Flota sailing from Havana to Spain.	Florida Keys	Logan, 1977 Meylach, 1978 Skowronek, 1982

				Mathewson, 1991.
1766	Nuestra El Constante	Spanish Treasure ship sailing from Veracruz to Spain.	Louisiana Coast of the Gulf of Mexico.	Pearson, 1981

5.7 ARTIFACT DESCRIPTIONS.

As the primary component of the archaeological record of any site, artifacts are the essential tools archaeologists use to explain a wide variety of human behavior contained in that record (*Schuyler*, 1978). The surviving material remains provides the key for understanding many of the wider questions archaeologists like to think about such as temporal fluctuations, contextual associations, functional explanation, cultural change and social interpretation (See *Bass*, 1988; *Henderson*, 1986) (see Appendix D). But before artifacts can be used in conjunction with their cultural contexts to explain some of these phenomena, they must be described first in site specific terms, and secondly, in a wider regional context. Archaeological study of the Pilar assemblage will focus on providing a framework for a descriptive study of different artifact categories including information on their date, cultural origin, physical characteristics and geographical distribution. This is seen as a beginning step towards achieving a better understanding of Spanish maritime culture of the Pacific. The future utility of this study will be based on its cultural context used by other archaeologists working on their own research problems.

5.8 ANALYSIS OF SPECIFIC MATERIALS.

POTTERY.

All glazed and unglazed earthenware found on the site, will be sorted by type in the usual way. A typological break down within types will occur when specific stylistic/ decorative modes can be identified.(i.e. Scrafitto ware or Puebla blue on blue.) Previously unknown wares will be described and typed by a normal classification system. It is expected that the sample size of the pottery collection should be quite large. This would allow for non-categorized samples of all types to be subjected to more detailed testing, in order to attempt to ascertain the origin of the material. Tests may include Chemical, Neutron Trace analysis or X-ray Diffraction Chromography. This would serve to further trace the collection to Old World/New World, Oriental or local (intrusive) materials.

GLASSWARE.

All glass will be treated similarly to the pottery (i.e. in the conservation aspect and in the study aspect). Typological break down by type (i.e. green glass, clear glass, or other) would be the first stage. The next stage would be a further break down into actual types (i.e. case gin, onion bottle tumbler, pane glass or ornamental glass). It would then be subjected to similar testing as the pottery. However, special pieces would be sent to the Corning Museum of Glass for a more in-depth historical and non-destructive technical analysis.

IRON.

Objects composed of ferrous materials will undergo standard conservation procedures of electrolytic reduction and protective coatings, in order to minimize any future environmental damage (See *MacLeod*, 1987;1989). Metallurgical analysis will be used on representative samples to ascertain the manufacturing techniques and the possible origin of material. The use of one representative cross section of the

assemblage will be held in perpetuity by the *Pilar Project* for the projected museum, which will be produced to house and exhibit the finds from the Pilar.

ORGANIC.

Samples of all organic materials will be analyzed and studied. Wood samples from major ship timbers will be studied in detail. There are no plans, at present, to recover major hull timbers. If found, these will be mapped, measured and photographed in-situ. No hull structures will be disassembled.

BALLAST.

All rock ballast will be examined using five major variables: size, volume, density, rock type and sphericity. Petrographic examination with binocular microscope and thin sections will assist in tying together different rock types with the local geology of the Cavite area in the of Manila, Philippines (Ballast Analysis Study : Pilar MS on file).

5.9 SHIP CONSTRUCTION.

Very little is known about the design and construction of Manila galleons. No archaeological excavations have yet scientifically examined wooden remains of such a vessel. How these ships were built in the Philippines using native woods indigenous workmanship, and locally made rope and ironwork is perhaps one of the most interesting questions surrounding the Pilar project (*Blair and Robertson*, 1903-1909).

The Philippines were very much a province of the Chinese Empire. The Chinese maintained a strong position in the commercial and industrial activities affecting the galleon trade (*Schurz*, 1939). China was not only the principal source of the galleon's eastward cargo, it was the source of much of the shipbuilding skills that went into the construction of the Manila Galleons. To the Spanish in the New World, the galleon known as "Nao de China" (China Ship) implied much more than just a name. In many respects the galleons themselves were probably as much Chinese as they were Spanish. The Chinese technology and skilled workmanship that went into building galleons in the Philippines to a great extent reflected ship-building techniques which long pre-dated the Spanish arrival in Southeast Asia. To what extent does the Chinese shipbuilding expertise involved in the construction of the great ocean-going junks of the 14th and 15th centuries influence 17th Century galleon construction ? (See *Green and Harper* 1983; *Green* 1983 a & b, 1986; *Keith* and *Buy*, 1981; and *Stanforth*, 1986).

Documentation clearly attests to the fact that galleons built in Cavite relied heavily on local woods, irons and lead from China and Japan, as well as cordage and sailcloth from local sources. The iron foundry in Cavite produced both ships cannon and anchors.

To what extent will the shipwreck artifacts excavated from the Pilar site reflect Asiatic raw materials and workmanship ? How will Chinese iron manufacturing techniques differ from Spanish pre-industrial metal working techniques ? To what extent will Chinese workmanship be reflected by the architectural remains of the Pilar's lower hull structure ? A comparative study would be most interesting between the archaeological evidence found on the Pilar site with similar data available from the Chinese fleet of Kublai Khan lost off Japan (See *Green* in *Throckmorton* 1987; *Mozai*, 1982).

Although the Pilar contract for constructing the vessel in Cavite in 1688 has not yet been located, a book entitled "Navegacion Expeculative Y Practica" written by Joseph Gonzalez Cabrera Bueno provides valuable insight into how the Manila galleons were built. Dedicated in Manila on June 3 1733, and published a year later,

the navigation instruction manual includes a chapter entitled "De Los Reglas Y madidos Para Fabricar Nevios...". This chapter provides a good description of Philippine shipbuilding around the time the Pilar was built. It provides actual shipwright practices and a detailed description of the important dimensions and proportions of the major structural components of the Manila Navio. (See Appendix F-2) This work is on file in the MARC archives, University of Guam. It is divided into five parts with a prologue and an introduction written in 1970 by W. Michael Mathas. The document was translated in Guam by G. Geiver Anderson in 1985.

The author of this book was a native of the Canary Islands who started his maritime career in 1701. A short time later he sailed to the Philippines where he became involved with the Manila galleons and the trans-Pacific trade. He made the Manila-Acapulco-Manila voyage several times during which he became an experienced navigator of the trans-Pacific crossing. His work was more than just a theoretical treatise as it dealt with practical navigation between the Philippines, New Spain and the major ports of India, China, and Japan. The chapter on shipbuilding is seen as a practical hands-on guide about what was going on in the shipyards of Cavite. While in the Philippines Bueno rose to the post of Admiral and Pilot Major of the Manila galleons. His book was dedicated to the illustrious Admiral Senor D. Fernando de Valdes Y Tamos, Knight of the Ordeal of Santiago, Brigadier of the Royal Army of his Majesty and of his court, Governor, and Captain General of the Phillipine Islands, and President of his Royal Audencia and Chancery.

The Bueno document provides excellent base-line architectural data which can be used to compare the structural information gleaned from the archaeological remains of the ships wooden hull and rigging. By comparing the physical remains of the Pilar with the written descriptions of how a Manila galleon was supposed to have been built, about a generation after the sinking of the Pilar, new insights about shipbuilding techniques in the Pacific will be revealed for the first time. The archaeological evidence concerning differences between the Pilar constructions and the documentary evidence published in 1733 may represent evolutionary changes to shipbuilding practises which would be important to document.

5.10 MATERIAL CULTURE.

The vessel not only contained Spanish American cargo, and Spanish-made merchandise, but also products from other European countries as well. Moreover, oriental luxuries which had originally arrived in Mexico from the eastward voyage of the Manila galleon will also be represented as personal effects of the ship's officers and passengers. The cosmopolitan character of Mexico City was described in the late 16th century as being where Spain and China meet and where Italy is linked with Japan. The existence of a Chinese merchant community in Mexico City prior to 1600, clearly documents the important role the Manila galleon trade had in developing trans-Pacific commercial exchange with Spain. As the new commercial orientation developed across the pacific throughout the 17th century, a corresponding change in trans-Atlantic trade with Europe occurred. However there is very little surviving physical evidence of this Chinese trade in Spain or in Mexico. The best place to look for such archaeological evidence is on shipwrecks such as the sunken Spanish 1715 Treasure Fleet. (Mathewson - 1984) The Pilar excavation should amplify the east-West trade connections of the 1690 period.

5.11 CERAMIC QUESTIONS.

The predominance of ceramics in Spanish colonial material life has long been recognized by archaeologists. (*Goggin*, 1960). Hispanic ceramics have been studied more intensely than any other aspect of colonial material culture. A great amount of effort has been made establishing the date of pottery "types" and their role in reflecting

social attributes in the archaeological record (*Deagan*, 1988). Much of this work has been centered on describing varieties of Hispanic ceramics that typically occur in New World land assemblages. Although some reference has been made to shipwreck evidence, much remains to be done before this source of ceramic data is built into an over all temporal/cultural framework (*Mathewson*, 1991).

Study of the ceramic data derived from the Pilar site might provide some new insights into the following archaeological problems:

1. How can studies of middle style Spanish olive jars defined by Goggin in 1960 be used along with recent data from historic shipwrecks off Florida and the Caribbean to culturally and chronologically define the olive jar assemblage on the Pilar?

2. How can the Pilar ceramic assemblage recovered from within a closed context better define the wide variety of unglazed course earthenwares which appear as ubiquitous utilitarian vessels on 17th & 18th century Spanish colonial sites? The confusing classification terminology used to type these vessels on the basis of past, form and/or function needs clarification.

3. A wide range of lead-glazed course earthenwares found on Spanish colonial sites from the 16th to 19th century have remained undated with uncertain origins. The Pilar ceramic assemblage may help to clear up uncertainty concerning undefined wares excavated from land sites. It will provide tightly dated pottery (pre 1690) which can be compared to archaeological land assemblages obtained in different chronological contexts from excavated sites on Guam and other areas of the Pacific.

4. Although Old World Majolica "types" have been well defined, closer temporal periods for New World types from Mexico City, Pueblo, and Panama need to be more closely archaeologically examined during the 1650-1700 period. The Pilar site might represent an excellent opportunity to compare the presence and absence of both Old World and New World Majolica types resulting in a much tighter temporal sequence than has been previously possible for the late 17th century.

5. Cultural and temporal relationships need to be determined between Japanese, "Old Imari" Porcelain (1660-1753) ; K' Hsi Chinese Porcelain (1662-1753) ; Chinese Imari Porcelain (1700-1750) and other Asiatic wares commonly found on colonial land sites. Associated porcelain on the Pilar might help to establish better correlations between these wares. (See Appendix L).

6. Non-Hispanic European and Asiatic ceramics including stonewares and celadon, have very rarely been studied within a tightly dated cultural context during the colonial period. Such a study on the Pilar collection would no doubt provide new insights to a whole host of new cultural questions relevant to world trade during the late 17th century.

Archaeological considerations of the Mexican and Spanish ceramics associated

with the 1690 Pilar assemblage would be of great interest as cultural and historical reflections of commercial exchange across the Pacific between the Valley of Mexico and Asiatic emporiums (*Rosenberg*, 1981). Mexico City was the most important Spanish commercial center in the New World throughout the 17th century. Market demands for the best tablewares were met by local potters in Mexico City and nearby Pueblo where much of the fine grade majolicas were made during the 17th and 18th centuries.

5.12 SILVER BULLION.

Without a manifest it is impossible to know how much of the Pilar cargo consisted of silver ingots. However, the study of treasure cargos on Spanish shipwrecks throughout the 17th century suggest it would be unusual if there were not a good number on board. Archaeological mapping and in-situ photographic documentation on the Atocha site has verified for the first time how and where the silver ingots were shipped on Spanish galleons of the period. (*Mathewson, Nd-1*) A close comparison of the information concerning how the silver ingots were stored on the Atocha with what is learned from the Pilar site should provide a basis for determining whether or not a pattern is determinable.

The recovery of silver ingots from the Pilar site will provide new insights to the maritime commerce and business transactions existing between the merchant communities of China and Spanish American colonies. Ingots containing merchant marks can provide evidence of a business transaction not recorded anywhere else. Marks found on Pilar silver ingots can be compared to the hundreds of marks recorded from the Atocha assemblage for a comparative study of 17th century shipping patterns. (See Appendix D)

5.13 SILVER SPECIE.

Historical documentation suggests that there may be well over 1,000,000 silver coins on board when the Pilar sank. This is more than was listed on the Atocha manifest in the treasure fleet sailing from Havana to Spain in 1622. Even though some silver coins were salvaged soon after the vessel sank in 1690, there are no doubtedly great quantities remaining in the coin chests packed tightly together in the orlop cargo areas of the remaining lower hull structure. Archaeological evidence from the Atocha site indicates that each coin chest will probably contain about 3,000 coins. Many of these coins will have fused together forming large coin conglomerates in the shape of the rectangular wooden chests which held them. Experience has shown that coins found on the inside of these silver conglomerates will be beautifully preserved from chemical disintegration in the sea water. (*Mathewson, 1986*)

The numismatic study of the Pilar assemblage will represent the first time such a New World collection of Spanish colonial coinage will be analyzed in a trans-Pacific context. Information gleaned from the coins will provide new insights to the historical and technological development of Spanish mints throughout their American colonies. New ideas concerning world trade and commercial transactions between the Americas and the Orient will help to place into perspective a better understanding of China's role in the world's economy during the late 17th century.

The Pilar silver coin assemblage will closely reflect many of the numismatic components documented in the archaeological study of over 110,000 coins from the 1622 Atocha site. See Appendix D for comparative data which will be used to describe and interpret the 1690 Pilar collection.

5.14 GLASS.

The study of Spanish glassware has been largely limited to ornamental pieces, or heirlooms in museums and private collections. Very little archaeological attention has been given to the study of common utilitarian glasswares of the colonial period

(*Deagan* 1988). Comparatively few good examples of the more common Spanish forms such as bottles, vials, flasks, drinking glasses, tumblers, and decanters have ever been studied. Most Spanish colonial sites have produced far more glassware from other European countries than they have from Spain. Although glasswares exported from Spain were thought to be superior, very few examples of ulitarian glasswares made in Spain prior to 1700 have been reported archaeologically. Spanish glasswares have been conspicuous from their absence on shipwrecks pre-dating the Industrial Revolution.

Examination of the Pilar site should provide an opportunity to study some of the archaeological questions concerning the presence and absence of glass of different origins at a time when utilitarian glass became more wide spread on colonial land sites throughout the Americas. Interesting comparisons could be made with the colonial Williamsburg late 17th century glass collection and the glassware recovered from the submergence of Port Royal, Jamaica in 1692 (*Hume*, 1980). Another glass artifact which would be of great interest on the Pilar would be beads widely used as personal decoration and trade item through the Spanish colonial period. Important archaeological studies on the classification of glass beads (*Deagan* 1988) has laid a firm basis for further studies on late 17th century beads which might be found on the shipwreck in some quantity.

The first glass beads described in any quantity in the Pacific were associated with the Griffon wreck (*Goddio* 1988). A comparative chronological study would help to establish for the first time a typological framework for the Pacific trade routes.

5.15 MEXICAN GOLD SPECIE.

The study of 1146 Mexican gold doubloons recovered from the 1715 Spanish treasure fleet off Florida has opened up a number of new research opportunities. Prior to the salvage of the wrecks beginning in 1963, many Colonial American numismatists had never seen a single gold coin specimen. Numismatic authorities specializing in New World Spanish coinage could largely only speculate about Mexican gold coinage pre-dating 1715.

The availability of numismatic data deriving from the on-going archaeological salvage activities of the 1715 shipwrecks over the last 25 years (*Burgess* , 1980 ; *Mathewson* , 1984) has made possible, for the first time, descriptive and analytical statistical analysis on large coin assemblages. This computer analysis by Dr Alan Craig has produced a database which helped to determine several relationships which would have gone undetected if the Mexican gold doubloons were just examined individually. Using the State of Florida collection, Frances Keith, former staff member of the Bureau of Archaeological Research, Florida Department of State, successfully developed a classificatory system enabling her to distinguish many subtle differences in die variations of the obverse shield and reverse cross (see Appendix D). Her work has clearly demonstrated that there are a number of artistic variations that can be used to closely date a coin when there is only a partial date or none at all - usually the case with coins of this period.

Archaeological work on the Pilar site might help to answer several interesting numismatic problems presented by the Mexican gold coin assemblage from the 1715 shipwreck sites. The following problems have been posed by Craig, 1988 :

1. What happened to the gold coin production in Mexico City mint from 1679 to a few years before the sailing of the 1715 treasure fleet ? Was it hoarded and simply not released in any large numbers before the 1715 sailings ? Craig has pointed out that if the coins had been released into commerce "more specimens would have found their way into the numismatic market and from there into the collections where

Burzio and others would have noticed them" . (1988 : 48-49).

2. Why was the rarest coin found on the 1715 sites (the "Royal" Eight Escudo dated 1695) produced with such great skill and then kept out of circulation for 20 years ?

One possible explanation might be that the Mexican mint gold coins were siphoned off to feed the commercial transactions linking the trans-Pacific trade between Manila and Acapulco. We know that Mexico regulated an enormous amount of trade between the Spanish American colonies and the Orient. It is very possible that many of the gold coins from this mint ended up on westward sailing Manila galleons and are now to be found in considerable numbers among the remains of shipwrecks such as the Pilar.

It is inconceivable that gold coins which were minted to facilitate business transactions and overseas commerce would have been purposely withheld from public circulation. But as Craig has pointed out , if they had been in circulation, they would have been mentioned in documentation and surfaced back in Spain as other contemporary gold coinage did. Are the answers to this puzzle to be found beneath the waters of the Pacific ?

The excavation of the Pilar site might help to solve the mystery of the "lost" Mexican gold coinage from the first strike in 1679 to 1690 when the Pilar sank. The comparison of gold coins found on this site with the 1715 numismatic assemblage would go a long way towards refining numismatic classification of the old period while shedding some new light on worldwide commercial transactions during the late 17th century.

5.16 EXHIBITION.

Marine archaeology in the United States has not yet emerged from the "Ivory Towers" of the academic community to become a socially involved field of public education (See *Fagon*, 1985). As a result of the growing need to involve the public, archaeologists are under increased obligation to inform not just colleagues, but also the general public of the results of their underwater research. The public wants to know about shipwrecks and the objects recovered from them. In response to this need, a Pilar exhibit will be set up with the following objects in mind :

1. To set out for several audiences centered in Guam historical and archaeological events which come together in the wreck ;

2. To constructively utilize the exhibit to communicate back to the Guamanian community the results of the shipwreck excavation. This gathered data belongs to the public as part of their cultural heritage.

The most significant aspect of the exhibit from the perspective of the public would be the focus of the trans-Pacific Spanish Manila trade of the 17th century. It could provide a social and cultural reference point and a form of communal memory of an important historical period of the Pacific (See *Hodder*, 1987).

An exhibit will be set up utilizing the data from the excavation, unique artifacts, and some of the significant results. The exhibit will be designed for a general audience. The approach will be an informative one, defining shipwrecks as archaeological resources, their significance to social and scientific research, and the kinds of information that shipwreck archaeology can yield (See *Witteborg*, 1981).

Teaching materials and lesson plans (4-12) will be generated with assistance

and guidance from University of Guam. New teaching components arising out of the Pilar project can be integrated into a classroom curriculum under the supervision of Guam School Board educators.

5.17 RESEARCH CENTER.

Archival and archaeological research data compiled on the Pilar site will be used as a nucleus to develop a computerized data base on the 16th to 18th century and shipwrecks throughout the Pacific. Research associates at the University of Guam and MARC will be invited to assist in the building upon the data base for a comprehensive cultural and historical study of the Manila Galleon trade.

5.18 GOVERNMENT INVOLVEMENT.

GovGuam will be actively involved in all phases of the site and laboratory operations through a find provided by the Project. Monies will be made available to the Department of Parks and Recreation to free up the services of Vic April, Vic Torres, and John Salas, so they can participate on a revolving basis as an integral park of the archaeological team. They will officially represent the Department of Parks and Recreation as active members in all data collection, site excavations, artifact stabilization and laboratory research.

Fig 1 TYPICAL CROSS SECTION OF SAND GULLIES
(not to scale)
PILAR PROJECT
RECONSTRUCTION OF "CANYON" AREA

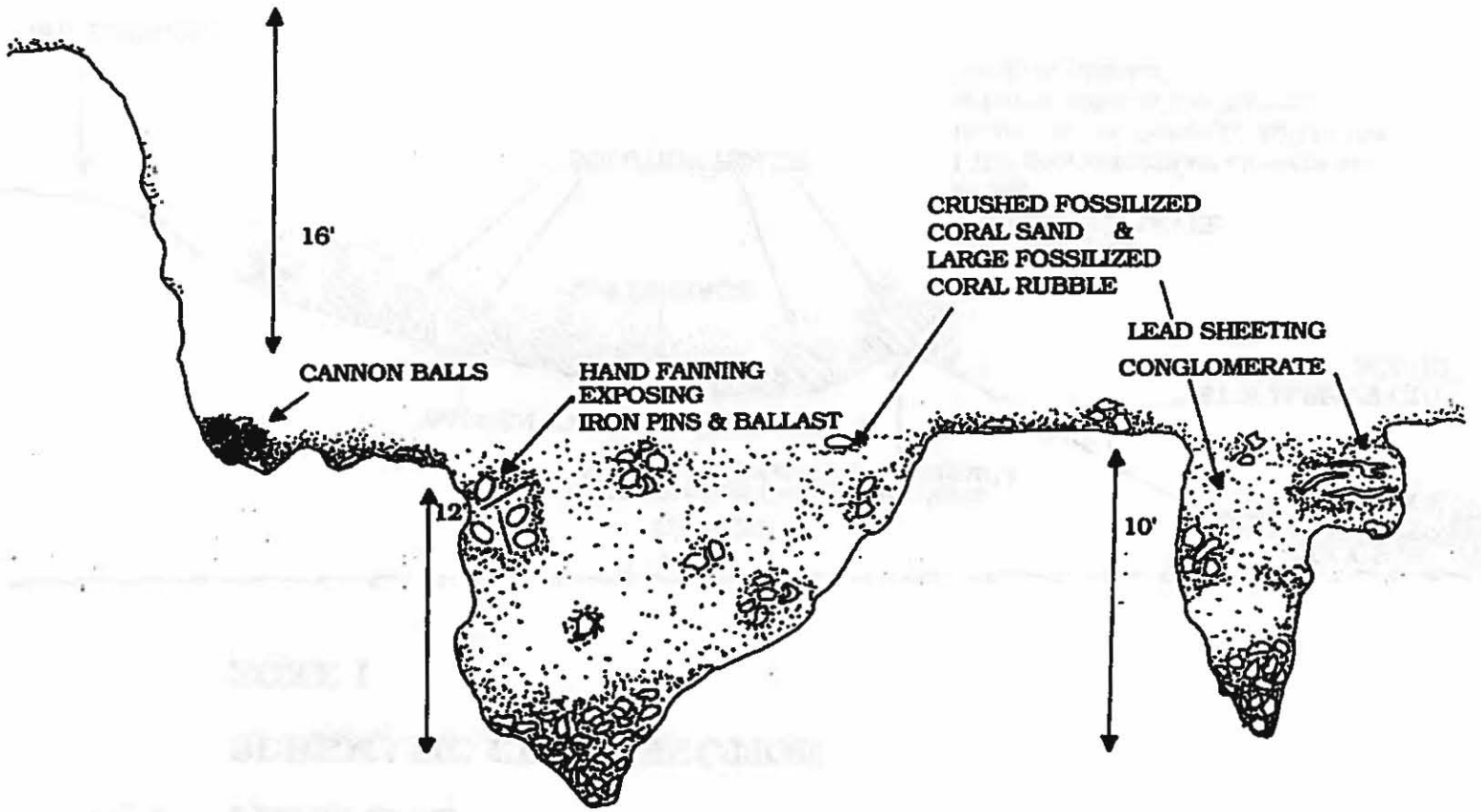


Fig 2 PILAR SITE

SCHEMATIC CROSS SECTION

ZONE I

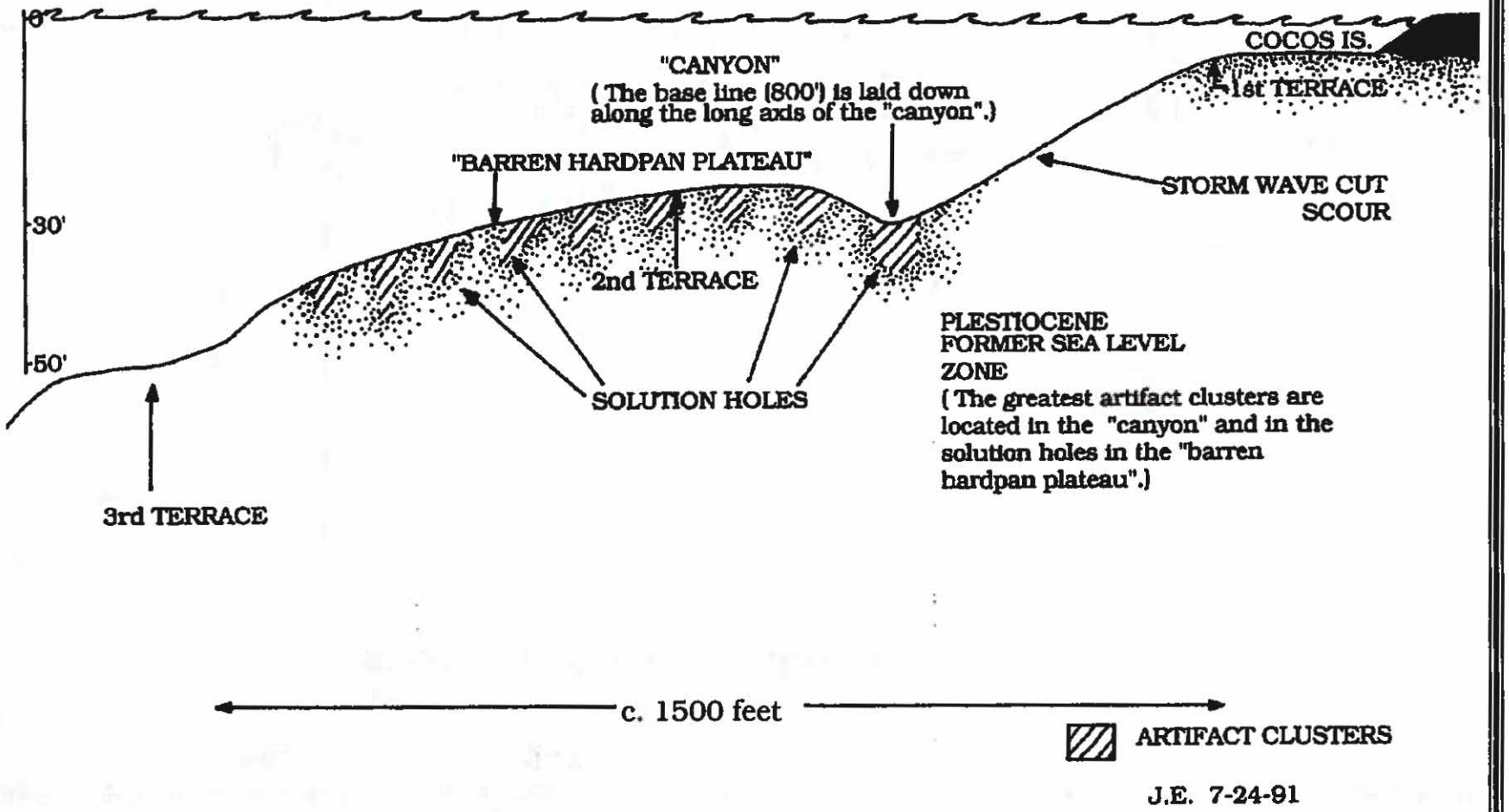
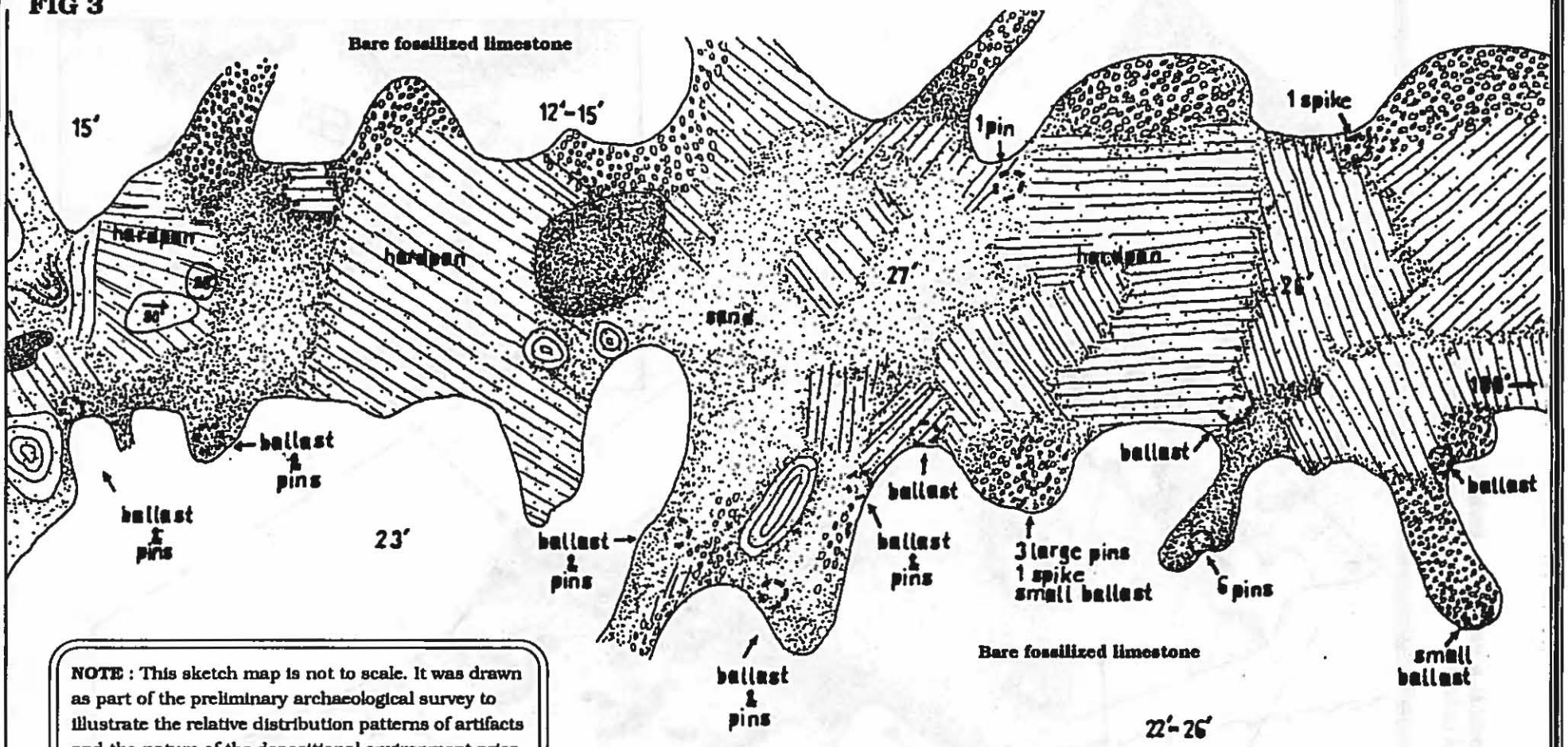


FIG 3



NOTE : This sketch map is not to scale. It was drawn as part of the preliminary archaeological survey to illustrate the relative distribution patterns of artifacts and the nature of the depositional environment prior to any test excavations and baseline mapping in the area of the site

C. 150' along Baseline between 13-16 bottom coordinates

PRELIMINARY SKETCH MAP OF CANYON AREA

NOT TO SCALE

THE PILAR PROJECT - June 1991

Fig 4 PILAR SITE: THREE DIMENSIONAL PERSPECTIVE DRAWING

MAPPING AND VENTURI EXCAVATION PROCESS

J. E. - July 30, 1991

6.0 REMOTE SENSING

6.1 SURVEY INTRODUCTION

The preliminary investigation to be conducted consists of an underwater archeological reconnaissance survey of submerged terrain in the vicinity of Cocos Island, off the southern tip of the island of Guam. The goal of this work is to locate and map the extent and depositional pattern of cultural materials in the survey area.

The following outline describes the methodology to be employed in conducting the survey. This includes a discussion of the equipment to be utilized and the procedures to be followed during the field work. Subsequent to completion of the field investigation, a comprehensive analysis of the data compiled will be accomplished and a technical report prepared and submitted.

The information presented below is organized into five sections. The first provides background information relating to the project area. The second provides a brief overview of some aspects of its cultural history. The third section presents a predictive model for the distribution of 17th century cultural materials in the survey area and the three hypotheses to be tested during the investigation. The fourth part is description of the field survey methodology. The last section describes the data analysis work and technical report preparation.

6.2 BACKGROUND INFORMATION

The area to be covered by this underwater archeological reconnaissance survey consists of submerged terrain off the southern end of Guam. The proposed survey will cover part of a larger territory that is referred to as the "project area." The center of the project area is located at the following position :

Latitude: 13 degrees, 15 minutes, 30 seconds North.
Longitude: 144 degrees, 39 minutes, 0 seconds East.

The outer boundary of the project area consists of a circle having a radius of three statute miles from the center position provided above.

The project area includes a variety of underwater environmental zones (see Figure 2 in the 4.7 Section). These consist of lagoon, coral reef, forereef slope, and deepwater submarine slope. Water depths vary from sea level to an approximate depth of 4,800 feet (800 fathoms). The lagoon zone consists of the area identified as "Cocos Lagoon" in Figure 1. The coral reef zone consists of the area labelled "Coral Reef" as well as the seaward submerged terrain to a depth of 18 feet (3 fathoms). The forereef slope is defined for the purposes of this study as the underwater terrain extending from the depth of 18 feet (3 fathoms) to the depth of 300 feet (50 fathoms). The deepwater submarine slope is defined for the purposes of this study as the underwater terrain extending from the depth of 300 feet (50 fathoms) to the depth of 4,800 feet (800 fathoms).

This reconnaissance survey will focus on selected portions of the total project area. The territory to be investigated in this survey consists of the submerged terrain within the project area that extends from sea level to the depth of 300 feet (50 fathoms). The study is being limited to that portion of the project area because of the technological limitations of the equipment to be utilized and the effective capabilities of the procedures to be employed. At some future date, the remainder of the project area may be surveyed as well. However, any decision regarding that possibility will need to consider the findings of the proposed reconnaissance survey covering the depths from sea level to 300 feet.

The boundaries of the proposed reconnaissance survey area are shown in Figure 1 in the 2.3 Section. As discussed above, it will cover submerged terrain in the vicinity of the Cocos Island and Lagoon reef system that extends to the 50 fathom depth contour.

6.3 CULTURAL HISTORY

The project area has a cultural background extending from the prehistoric period of Guam's Chamorro people, through the Spanish colonial period to the present. Within that long period of time there are two major episodes of cultural activity that are likely to have left material remains that may be located during the proposed survey. Those two episodes are the shipwreck in 1690 of the ship Nuestra Senora del Pilar de Saragoza and World War II.

The location of the Pilar's shipwreck is fairly well documented. Based on available information, it appears to have taken place in the vicinity of the center point of the project area. In the aftermath of the initial wreck of the vessel, it is probable that a combination of natural and cultural influences resulted in the fragmentation of the ship and redistribution of its parts. The major goal of this survey is to locate and identify the patterning of the remaining artifacts that would have been deposited as a consequence of that shipwreck.

The other major episode of cultural activity that is likely to have left materials in the survey area is World War II (1941-1945). During that war, the island of Guam was subject to attack and capture by air, naval and military forces of Japan. After a period of Japanese occupation, it was also the object of attack and recapture by air, naval and military forces of the United States. It is likely that cultural materials associated with the 1941-1945 warfare activity are present in the survey area also.

6.4 PREDICTIVE MODEL

Based on an analysis of natural environmental information and historical documentation, a predictive model has been developed for the patterning of cultural materials associated with the wreck of the Pilar. This predictive model may be presented as three hypotheses, which are as follows :

1. The distributional patterning of artifacts associated with the Pilar shipwreck will reflect a greater influence by natural environmental factors than cultural factors.

2. The predominant environmental factors influencing the patterning of artifactual remains would have been currents, waves and storm activity during the period of June to December 1690.

3. The distributional patterning of artifactual materials will largely reflect an inverse relationship between the mass of individual objects versus distance from the original shipwreck location.

The procedures to be followed in testing the hypotheses of the predictive model are presented in the next section.

6.5 SURVEY METHODOLOGY

An attempt will be made to identify all magnetic anomalies over one gamma. All objects will be identified on the seabed without any major disturbance of the bottom deposits. Non Pilar artifacts will be plotted and left in-situ unless the SHPO wishes to have them recovered.

As soon as a homogeneous artifact scatter pattern associated with the Pilar site can be identified, a buffer zone can be established around the total perimeter of the site to avoid possible conflict with other activities off this part of Cocos Reef.

Shoreline transit work and GPS data should be able to map out with some precision a total scatter pattern consisting of the Primary, Secondary and Tertiary archaeological zones.

When a magnetic anomaly is recorded a surface buoy will mark its position and it co-ordinates will be determined by GPS and recorded. When a number of such

anomalies have been buoyed divers with metal detectors will pinpoint them. Those that are covered in sand will be uncovered by hand fanning so that they can be identified. Only those artifacts thought to belong to the Pilar period will be recovered. They will be recorded like any other artifact. Once the anomaly targets have been identified and plotted on the site map, the surface buoys will be removed.

The reconnaissance survey area has been divided into three zones based on their predicted potential for containing cultural materials associated with the wreck of the Pilar. These zones are defined as follows :

1. High Probability

2. Moderate Probability, and

3. Low Probability.

These zones are illustrated in Fig 1 on page 75.

During the field survey, the work conducted in each of the three probability zones will be allocated according to their ranking, from high to low. This procedure is being followed in order to ensure a judicious economy of effort, so that limitations on time and funding are considered in determining the intensity of work within the various parts of the survey area. The allocation of effort expended will be determined in consultation with survey project personnel and other concerned parties. Decisions will take into account the available documentation concerning the loss of the Pilar and the project area's environmental characteristics.

The field operation personnel will be divided into two teams. These are the survey boat team and the onshore navigation team. The survey boat team will operate the remote sensing instrumentation during the field survey. The onshore navigation team will provide guidance to the survey boat in order to maintain its course along the designated transect lines.

The remote sensing instrumentation will be operated from a boat suitable to serve as the equipment platform. It will have sufficient work space to set up and operate the equipment utilized, and be equipped with an appropriate radio for communication with the onshore navigation party.

The primary remote sensing instrument to be used is a marine proton magnetometer. The magnetometer will provide data relating to the presence or absence of ferrous cultural material such as that normally associated with sunken vessels and scattered shipwreck remains.

The survey vessel will also be equipped with a sonar depth recorder. It will be used to record the water depth and bathymetric contours. It will also provide depth information for the location of magnetic anomaly targets detected by the proton magnetometer.

The patterning of remote sensing survey lines will be based on the archeological survey procedure known as "radial transect interval sampling." This consists of a series of lines (transects) that radiate out from a point of origin (the onshore navigation station). The radial fan-like pattern of lines is configured to provide coverage of the designated survey area.

Navigational control will be provided by one or more onshore station locations where a surveyor's transit will be set up. The onshore station will have a radio to provide voice communication with the survey vessel. The location(s) for the onshore station will be determined in the field at the beginning of the survey investigation.

The standard field operations will consist of the survey vessel proceeding along transect lines passing through the survey area. Each transect followed will be a radial line-of-sight from the onshore navigation station. Visual observation of the survey vessel's path along the designated line will be maintained with course corrections provided as necessary by radio. The degree interval between transects will be

determined from an assessment of field conditions at the beginning of the survey.

Additional transect lines will be surveyed by following topographical bottom contours. Taking into account conditions encountered in the field, these additional transects will consist of a series of lines running parallel with the long axis of the reef system in the survey area. They will utilize the natural configuration of the bottom as shown by the sonar depth recorder, to follow selected bathymetric contours of constant depth.

It is anticipated that initial transect lines will be spaced no more than 20 meters (60 feet) apart. A sufficient number of lines will be run to ensure complete coverage of the high sensitivity survey area. Supplementary survey lines at tighter spacings will be run as necessary to locate and/or pin-point magnetic anomaly targets. Targets detected will be assessed in the field, and may be temporarily marked with buoys depending on the conditions encountered (such as water depth and sea state) .

For all anomaly targets discovered that are of potential significance, additional anomaly-specific magnetometer investigations will be made. These will compile further information concerning maximum amplitude and configuration of those anomalies as well as water depths. Locations of potentially significant anomalies will be recorded by means of cross-sightings from onshore transit stations. As conditions dictate, visual and hands-on inspections of selected anomaly targets will be made by scuba divers deployed from the survey boat .

A field journal will be maintained throughout the survey work . It will provide the basic record of the operations and incorporate narrative descriptions of the work and its findings on a daily basis . In addition, the magnetometer and sonar chart data records will be annotated during the survey and cross-referenced to the field journal.

6.6 DATA ANALYSIS

The information compiled during the survey will be reviewed and correlated. Magnetometer chart records and daily journal entries concerning the magnetic anomalies discovered during the remote sensing survey will be analyzed . Locations of anomaly targets will be plotted on maps of the survey area. In addition, each anomaly will be described in detail and evaluated in terms of its potential cultural association and significance (See *Arnold*, 1981). The depth recorder chart records will be utilized to prepare bathymetric cross-sections of the survey area and to assess water depth and bottom topography at anomaly target locations. The anomaly maps and bathymetric profiles will be presented in the survey's technical report.

Preliminary evaluations and identifications for all cultural materials encountered in the survey area will be prepared (See *King*, 1978). Levels of potential significance, based on remote sensing data and diver inspections, will be assigned to each. If appropriate, archeological site survey report forms will be completed for any previously unreported archeological sites.

6.7 MAGNETOMETER REPORT

A technical report describing the conduct and findings of the investigation will be prepared. It will contain a discussion of historic period cultural developments and shipping patterns as they relate to the maritime history of the project area. Also included will be a description of the history of the Pilar shipwreck.

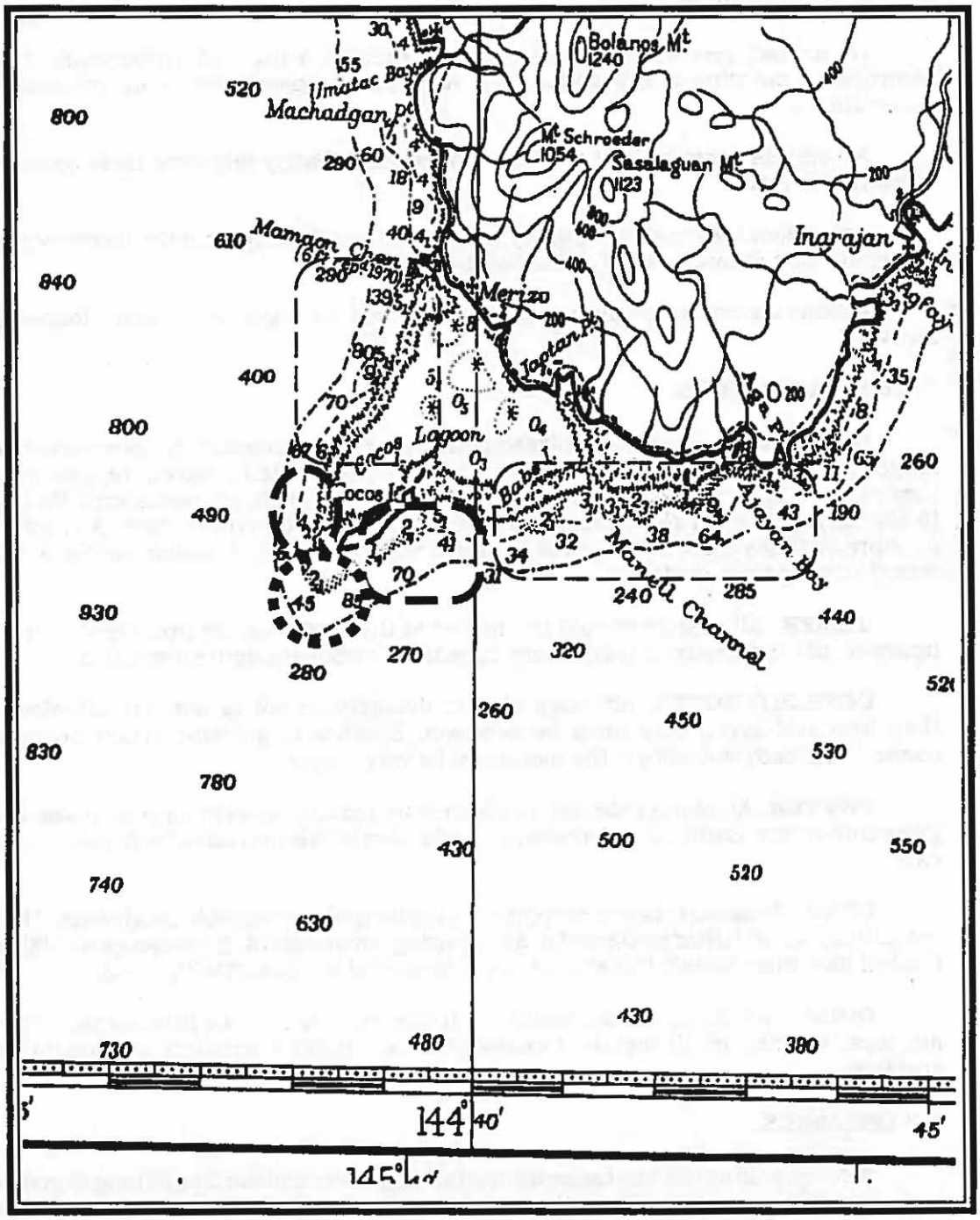
The methodology of the field survey will be described in the report. This will be followed by a description and evaluation of the results. Preliminary interpretations of the potential significance and identity of any cultural materials and magnetic anomaly targets recorded during the field survey will also be presented.

The concluding section of the report will contain an evaluation of the results of the field work in relationship to the research design's predictive model and hypotheses. Recommendations concerning the potential need for further archeological investigation of the survey area will also be presented.

FIG 1 : SHIPWRECK PROBABILITY ZONES

LEGEND :

- ••••••• High Probability
- ▬ ▬ ▬ Medium Probability
- — — — Low Probability



7.0 ARTIFACT HANDLING

7.1 GENERAL.

Artifacts will be mapped on the bottom and plotted on the site map at the end of each day. Each major artifact will be recorded, described and photographed as part of the site inventory which will be compiled at the end of each month. As the artifacts are cleaned, stabilized and photographed in the lab they will be interpreted and written up in the overall horizontal and stratigraphic context of the site.

No artifact recovery will be made until they can be adequately dealt with by an archaeological staff member.

No artifact recovery will be conducted without a tag and provenience data recorded at the time of excavation with full site documentation of its contextual associations.

All objects must be kept wet at all times immediately following their recovery from the bottom.

An artifact tag must accompany each object continually from the recovery and transportation through the stabilization process.

Artifact inventory forms must be completed as soon as possible following recovery.

7.2 METAL OBJECTS.

IRON. All objects must be placed in artifact tanks immediately upon recovery. Large artifacts which cannot fit into tanks must be kept wetted down on the boat until they can be removed to larger storage shore facilities. All shell/encrustation adhering to objects must be left alone. No attempt should be made to remove them. All objects in shore facilities must be placed in 5% fresh water solution of sodium carbonate to retard rusting from oxidation.

SILVER. All objects should be treated in the same way as iron objects. It is, however, not necessary to place them in sodium carbonate aqueus solution.

COPPER/BRONZE. Although objects disintegrate out of water much slower than iron and silver, they must be kept wet. Because of galvanic action between copper/tin/lead/zinc alloys, the metal can be very fragile.

PEWTER. All objects should be cleaned by soaking in a lye bath in enamel or glass containers. Badly corroded pewter can be very brittle and must be handled with care.

LEAD. These objects can become very brittle under anaerobic conditions. They are usually much better preserved in an oxidizing environment. They can generally be treated like other metals but should never be stored in contact with wood.

GOLD. Made from an inert metal, such objects do not react with seawater. They are least effected of all metals. Occasionally, a CaCO3 encrustation appears on surfaces.

7.3 CERAMICS.

Salt crystallization can cause fabric disintegration and surface flaking of glazes and post firing painted decorations. Pottery fired under low temperatures are particularly susceptible. All ceramics including stonewares and porcelain should be

kept immersed in fresh water prior to conservation treatment.

7.4 GLASS.

Disintegration rate is determined by : composition, PH and temperature of the depositional environment. Glass delamination causing irridescent "onion skin" layers is difficult to stabilize. No attempt should be made to remove them. These flaking layers can sometimes be used to date the objects. Badly flaking glass should be stabilized as quickly as possible with a surface sealant.

7.5 STONE.

Although it usually has the appearance of excellent stability, seawater and marine borers can cause considerable structural weakening depending upon its mineral composition.

7.6 ORGANIC MATTER.

Leather, bone, rope, teeth, seeds, wood, textiles, ivory, dyes and paper are the most common organic substances found on shipwrecks. They are fragile and must be carefully treated at all times. In some instances, evaporation and air exposure can cause irreparable damage in not much more than 30 seconds. All fragile organic material must be recovered with an artifact tray by placing it under the object with some sediment matrix adhering to it to provide stabilization. The more fragile material should be placed in polyethylene bags while still underwater.

7.7 COMPOSITE MATERIAL.

Objects made of different types of material present the most difficult stabilization and conservation processes. Stabilization treatment will depend upon professional advice on a case by case basis.

7.8 FIELD CONSERVATION.

Throughout the project, an archaeological conservator will be available to help supervise the recovery, transportation, storage and stabilization of all artifacts. Professional services will be provided to assure the smooth running of a conservation program organised into three separate components :

1. Developing storage and stabilization on-shore facilities along with boat procedures to maximize field conservation of recovered artifacts;

2. Training local volunteers and university students as lab personnel for artifact stabilization, data recovery and inventory descriptions; and

3. Preparing for artifact conservation, exhibition and publication.

Stabilization equipment and facilities for the field conservation laboratory will be set up where the operational headquarters will be located. All personnel involved with handling artifacts and recording archaeological and environmental information will be briefed and instructed in the proper procedures by the conservator. Field laboratory staff volunteers, and the students at MARC and the Anthropology Department, University of Guam will all receive basic instruction concerning depositional environmental variables affecting artifact disintegration.

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1984 Underwater Archaeology, The Proceedings of the 13th Conference on Underwater Archaeology, Fathom Eight Special Publication #5, San Marino, California.

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MS

National Center for Shipwreck Research.

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8.6 PACIFIC SHIPWRECK ARCHAEOLOGY.

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8.7 MATERIAL CULTURE.

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1988 The Ceramics of Southeast Asia : Their Dating and Identification Oxford University Press, Singapore.

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1984 Cross-Cultural Trade in World History Cambridge U Press

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1987 "The Maritime Archaeology of Shipwrecks and Ceramics in Southeast Asia" in Australian Institute for Maritime Archaeology Special Publication No 4.

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1987 "The Ko Si Chang Three Shipwreck Excavation 1986" in Australian Institute for Maritime Archaeology Special Publication No 4.

Hodder, Ian (Ed)
1986 Reading the Past Cambridge U Press

1987 Archeology as Long Term History Cambridge U Press

1987 The Archeology of Contextual Meaninings Cambridge U Press

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1980 The Curation and Management of Archaeological Collections: A pilot Study. Cultural Resource Management Series. Heritage Conservation, and Recreation Service, U.S. Department of Interior.

McGimsey, Charles and Hester Davis, Editors
1977 The Management of Archaeological Resources: The Arlie House Report. Society for American Archaeology Publications, Washington, D.C.

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1978 Archaeology and Archaeological Resources: A Guide for those Planning to Use, Affect, or Alter the Land's Surface. Society for American Archaeology, Washington, D.C.

Terrell, John E
1986 Prehistory in the Pacific Islands Cambridge U Press

Trigger, Bruce Co.
1989 A History of Archeological Interpretations Cambridge U Press

Witteborg, Luthor P.
1981 Good Show ! A Practical Guide for Temporary Exhibitions, Smithsonian Institution Travelling Exhibition Service.

APPENDIX A - CURRICULUM VITA

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EDUCATION

Nova University Ed. D Degree (education)	Ft Lauderdale, Florida 1991 -
Florida Atlantic University MA Degree (Anthropology)	Boca Raton, Florida 1975 - 1977
University of London Institute of Archaeology ABD - Doctoral Studies (Environmental Archaeology)	London, England 1961 - 1964
University of Edinburgh Graduate Studies (European Prehistory)	Edinburgh, Scotland 1960 - 1961
Dartmouth College BA Degree (Geology)	Hanover, New Hampshire 1956 - 1960

AREAS OF SPECIALIZATION

Maritime Archaeology; Cultural Resource Management; Public Archaeology.

PROFESSIONAL EMPLOYMENT

Director of Archaeology, Non-profit Educational Corporation, Marine Resources Development Foundation.	Key Largo, Florida 1989 - Present
Adjunct Professor, Director of Maritime Archaeology Program Florida Keys Community College	Key West, Florida 1987 - 1989
President and General Editor of Publishing Company Seafarers Heritage Company, Ltd.	Woodstock, Vermont and Key West, Florida 1983 - 1990
Executive Director, Non-profit Educational and Research Organization, National Center for Shipwreck Research, Ltd.	Key West, Florida 1989 - Present
Program Director, Maritime	Big Pine Key, Florida

Social Studies, Non-profit Educational Organization Newfound Harbor Marine Institute	1978 - 1980
Archaeological Consultant Tierra-Marine Associates	Miami, Florida 1973 - 1977
Government Archaeologist Director of Excavation Program Institute of Jamaica	Kingston, Jamaica, WI 1971 - 1973
Archaeological Research Fellow Co-director & Field Supervisor of Excavation Program University of Ghana.	Accra, Ghana, West Africa 1964 - 1970

GRANTS AWARDED

National Endowment for the Humanities (2); Kidder Peabody Foundation (2); Max and Victoria Dreyfus Foundation; Florida Endowment for the Humanities (2); Heritage Conservation and Recreation Service, U.S. Department of Interior; Fine Arts Council of Florida; Center for Field Research, Florida Department of Education (2); Historic Preservation office, Florida Department of State; Explorers Club; Monroe County Tourist Development Council; Division of Historic Resources, Florida Dept of State(3).

PROFESSIONAL ASSOCIATIONS

Society for Historical Archaeology; American Numismatic Association; International Society of Appraisers; Florida Academy of Sciences; Key West Maritime Historical Society; American Academy of Underwater Science; Florida Archaeological Council.

OTHER ORGANIZATIONS

Fellow of the Explorers Club, New York (Lowell Thomas Award Winner); CEDAM International.

UNDERWATER EXPERIENCE

1990 - Present	Archaeological member of Florida Dept of State Task Force on Underwater Archaeological Preserves.
1990 - Present	Director of Phase I CRM Survey of submerged cultural resources off the Florida Keys for DHR, Florida Dept of State.
1987 - Present	PADI Assistant Instructor's SCUBA Certification
1973 - Present	Over 1000 open water dives on Shipwrecks in Florida and Caribbean waters.
1973 - Present	Diving archaeological consultant on historic shipwreck sites, including Nuestra Senora de Atocha , Santa Margarita, 1715 Spanish Fleet, 1733 Spanish Fleet, Henrietta Marie, Land Tortoise (Raddeau) and Sindia.
1979	Director of NHMI Marine Archaeological Survey of historic shipwrecks along the lower Florida Keys.

1977	YMCA Assistant Instructor's SCUBA Certification.

UPLAND EXPERIENCE

1974 - 1976	Conducted field reconnaissance of prehistoric sites in South Florida
1971 - 1973	Administered and directed excavations and archival research on Old Kings House, 16th - 19th century Spanish and English Governor's residence, Spanish Town, Jamaica
1964 - 1970	Surveyed and excavated twenty-nine Neolithic and Iron Age sites in northern Ghana, West Africa
1968 - 1969	Conducted archaeological reconnaissance in Western Sudan, West Africa
1962 - 1963	Excavated Paleolithic and Neolithic sites in southern England

TEACHING EXPERIENCE

1990 - Present	Developed interdisciplinary maritime curriculum for MAST High School Academy, Dode County School Board.
1989 - Present	Marine Resources Development Foundation: Developed and taught Maritime Archaeology Teaching Program, workshops and field schools.
1989 - Present	Certified Monroe Substitute Teacher. Developed Monroe County School Board interdisciplinary curriculum (4-12) and taught Teacher Training Summer Institute.
1989 - 1990	Organized and taught Marine Archaeology Workshop for Marine Option program, University of Hawaii.
1987 - 1989	Adjunct Professor ,Florida Keys Community College: Directed development and taught Maritime Archaeology Program
1983 - 1988	Alliance for Maritime Heritage Conservation: Directed and taught Marine Archaeology program reaching over 1500 sport divers in 25 states.
1978 - 1980	Newfound Harbor Marine Institute: Directed development of Maritime Social Studies curricula involving course materials for "Humanities and the Sea" and "Coastal Zone Management" components. Organized and taught teacher shops, community outreach project and experimental youth programs (4-12) involving maritime archaeology, cultural ecology, anthropology, and oral history.
1978	Newfound Harbor Marine Institute: Organized and directed three - week field school for college students in Coastal Human Ecology and Underwater Archaeology.

1972	Institute of Jamaica: Organized and directed summer archaeological field school for secondary school students for the Institute of Jamaica.
1965 - 1968	University of Ghana: Organized interpretive museum exhibits and educational programs for school children and young adults.

PUBLIC FORUMS CONVENED

1989 (July 18 - 29)	International Maritime Festival of the Americas: Shipwreck Conference; Coral Reef Symposium, Archaeological Workshops.
1980 (Feb 29-Mar 2)	Maritime Cultural Heritage of the Florida Keys: How Can it be Preserved for Future Generations? (NHMI)
1980 (Feb 29-Mar 2)	Nuts and Bolts of Oral History (NHMI)
1980 (Feb 15-18)	National SCUBA Workshop: Sport Divers and Underwater Archaeology (NHMI)
1979 (Dec 7-9)	Humanities and the Sea Workshop (NHMI)
1979 (Nov 9-11)	Coastal Zone Management Workshop (NHMI)
1979 (Feb 16-19)	Conference on Cultural Resource Management Policies and Procedures to Protect Historic Shipwrecks on the Outer Continental Shelf at Conference on Underwater Archaeology, (San Antonio, Tx)
1977 (Nov 4-6)	Conference on Florida Historic Wreck Archaeology (Key West, Fl)

CURATORIAL EXPERIENCE

1990 - Present	Planned "Heritage Adventure" park for MAST Academy, Dode County School Board.
1990	Museum consultant to Florida Keys Land and Sea Trust to develop Historic Shipwreck exhibits for Natural History Museum of the Florida Keys.
1990	Director of Exhibits and Museum Education for "Treasure of the Golden Galleons" hands-on exhibit for Great Exploration's Museum, St. Petersburg,Fl.
1980 - 1987	Organized and directed the conservation and exhibition of the Nuestra Senora de Atocha and Santa Margarita artifact assemblage.
1978 - 1980	Developed NHMI teaching museum.
1975 - 1977	Developed administrative procedures and resource management strategies with the Manager of the Federal Antiquities Program, Office of Archaeology and Historic Preservation, U.S. Department of the

	Interior, in an effort to maintain the archaeological integrity of the Nuestra Senora de Atocha wreck site and all artifacts recovered from it.
1973 - 1977	Organized and directed curatorial services for the Atocha artifacts assemblage.
1976	Coordinated a public exhibition of the Atocha artifact assemblage in the Cape Coral Bank, Cape Coral, Fl
1976	Assisted in the organization of an exhibition of the Atocha artifact assemblage in Explorer's Hall, National Geographic Society, Washington, D.C.
1972	Planned an archaeological - historical site museum as part of the restoration program for Old King's House, Spanish Town, Jamaica.

FOREIGN TRAVEL

Greenland and the Canadian Arctic; Scandinavia and the Baltic; Western Europe and the Mediterranean; Soviet Union and the Black Sea; Turkey and the Balkans; Italy and the Adriatic; Crete and the Aegean; Ireland and the British Isles; North Africa and the Iberian Peninsula; West Africa and the Sudan; Cozumel and the Yucatan Peninsula; Cuba and the Antilles; Bahamas and the Caribbean; Guam, Hawaii and the Central Pacific; Egypt and the Red Sea.

MAJOR PUBLICATIONS & MANUSCRIPTS

ND-1	Archaeological Investigations of a Spanish Galleon : Nuestra Senora de Atocha MS National Center for Shipwreck Research.
ND-2	Footsteps in the Sea: Guide to the Maritime History of the Florida Keys Natural History Museum of the Florida Keys (forthcoming)
ND-3	A Guide to Marine Archaeology MS, National Center for Shipwreck Research.
ND-4	Ballast Analysis on the Pilar site. A methodological study, The Pilar Project Ltd, Agana, Guam MS on file.
1991	Ships and Shipwrecks of the Florida Keys : Phase I Archaeological Survey off Islamorada, Florida, DHR, Florida Dept of State, Tallahassee, Fl.
1989 (a)	International Maritime Festival of the Americas Program Seafarers Heritage Library, Woodstock, Vt. and Key West, Fl.
1989 (b)	Columbus Chronicles National Center for Shipwreck Research, Ltd.
1987	Seafarers Journal of Maritime Heritage Vol. 1 Seafarers Heritage Library, Woodstock, Vt. and

Key West, Fl.

1986 Treasure of the Atocha; Pisces Books and Seafarers Heritage Library

1984 Florida East Coast Shipwreck Project: Archaeological Reports Vol. I-IV Cobb Coin Co. Key West, Fl.

1983 Archaeological Treasure: The Search for the Nuestra Senora de Atocha Seafarers Heritage Library, Woodstock, Vt

and Key West, Fl

1982 "Archaeology on St. Eustatius: The Pompeii of the New World" Archaeology Vol. 35, No. 2 (with Dethlefsen, Gluckman and Barka)

1981 (a) An Inventory and Assessment of Historic Cultural Resources on the Outer Continental Shelf from Cape Hatteras North Carolina to Key West, Florida. Bureau of Land Management, U.S. Department of the Interior, Vol. III & IV (with other authors) under contract with Science Applications, Inc.

1981 (b) Shipwrecked 1622: The Lost Treasure of Philip IV catalogue for Queens Museum, New York (with Schneider and Lubowsky)

1980 (a) "Maritime Cultural Studies: Recent Developments from the Florida Keys," First Florida Maritime Heritage Conference, Tampa, March

1980 (b) "Two Approaches to Integrating Natural and Cultural Studies in the Florida Keys," Association of Interpretive Naturalists Conference, Cape Cod, Oct.

1979 "A Preliminary Report on the Historical Archaeology and Cultural Resources of St. Eustatius, Netherlands Antilles." Co-authored with Dethlefsen, Gluckman and Barka. (Privately circulated)

1977 "Method and Theory in New World Historic Wreck Archaeology: Hypothesis Testing on the Site of Nuestra Senora de Atocha Marquesas Keys, Florida." Unpublished thesis in University of Michigan microfilm file.

REFERENCES UPON REQUEST

CURRICULUM VITAE

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PERSONAL

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EDUCATION

North Carolina State University
Raleigh, North Carolina
9/73 - 5/75
Major: Engineering Operations No Degree

University of North Carolina at Wilmington
Wilmington North Carolina
9-77 - 5-80
Major: Environmental Studies (Specialization in Marine Science)
BA Degree: 5/80

East Carolina University ECU
Greenville, North Carolina
8/81 - 5/83
Minor: Coastal Marine Studies
MA Degree in History (Specialized Track in Maritime History and Underwater Research)

Thesis in Progress

Title: THE HENRIETTA MARIE;
An Archaeological Study of a 17/18th Century Merchant Slaver

PROFESSIONAL EMPLOYMENT

10/85 - Present	Field Archeologist for Treasure Salvors Inc Key West, Florida Director of Archaeological Operations for Cobb Coin Co Inc Fort Pierce, Florida. Project Director for Cobb Coin Co Inc Key West, Florida.
5/85 - 10/85	Field Archaeologist for the Florida Division of Archives, History and Records Management, Bureau of Archaeological Research, Fort Pierce and Vero Beach, Florida.
6/83 - 10/84	Field Archaeologist for Cobb Coin Co Inc Key West and Fort Pierce, Florida

8/81 - 5/83	Research Associate and Graduate Assistant for the Maritime History and Underwater Research Program, East Carolina University.
8/80 - 8/81	Archaeological Technician and Environmental Review Officer for the North Carolina Division of Archives and History, Underwater Archaeology Branch, Fort Fisher, NC.

PROFESSIONAL CONSULTING

11/87	Archaeological Consultant to the North Carolina Division of Archives and History, Underwater Archaeology Unit, Fort Fisher, NC.
1984 - Present	Archaeological Consultant to the Atlantic Alliance for Maritime Heritage Conservation, Washington DC.
1983 - Present	Archaeological Consultant to Neptune Explorations, Inc, Islamorada, Florida Keys
6/87	Archaeological Consultant to Pacific Sea Resources, Inc, Commonwealth of the Northern Mariana Islands, North Pacific.
1/85 - 2/85	Archaeological Consultant to Shipwrecks, Inc, Pittsburgh, Pennsylvania.

FIELD EXPERIENCE

Edenton NC Harbor Survey (May/July 1980), remote sensing survey of harbor area and creeks in vicinity of colonial port town. Assessment and excavation of two shipwreck sites, one tentatively identified as the SACRE COEUR DE JESUS (ca 1780) Jointly conducted by ECU's Maritime History and Underwater Research Program (MHURP) and North Carolina's Underwater Archaeology Branch (NCUAB).

Port Fisher Cultural Resource Survey (Aug 1980) remote sensing survey conducted offshore of Fort Fisher State Historic Site in response to proposed revetment construction by US Army Corps of Engineering. Survey conducted by NCUAB.

Federal Arsenal Magnetometer Survey (Nov. 1980), terrestrial magnetometer survey conducted by NCUAB at the site of the Federal Arsenal (ca 1840), Fayetteville, NC.

New Bern River Survey (June/Aug 1981) remote sensing survey of Trent and Neuse Rivers around New Pern, NC. Numerous sites recorded in areas shown historically to be high probability areas for submerged cultural resources. Conducted jointly by ECU's MHURP and NCUAB.

Cape Lookout Shipwreck Survey (June/Aug 1982), remote sensing survey conducted by ECU's MHURP and UCUAB in and around the area of Cape Lookout, Morehead City and the colonial port of Beaufort, NC. Numerous sites located and several excavated and mapped in Cape Lookout Bight.

Tranters Creek Project (Sept 1982), preliminary magnetometer reconnaissance conducted along the navigable length of Tranters Creek by a graduate survey team from ECU's MHURP resources dating back to the 18th Century.

Yorktown Shipwreck Archaeological Project (Sept/Oct 1982), field project con

ducted by graduate team from ECU on the site of Y0-88 one of numerous vessels scuttled by Lord Cornwallis at Yorktown, during the American Revolution. These sites, placed on the National Register of Historic Places in 19/3, afford archaeologists excellent opportunity to research 18th century ship construction and associated cultural material. This effort was the first to take place on the site of Y0-88 after a metal cofferdam was constructed to facilitate research within a controlled environment.

Roanoke Island Magnetometer Survey (Nov 1982) survey conducted by MHURP staff off Shallowbag Bag, Roanoke Island, NC in an effort to locate cultural resources potentially associated with Sir Walter Raleigh's infamous and ill fated Lost Colony (ca 1585).

Baison Sailing Canoe Project (Nov 1982), investigation designed to locate and recover material associated with a 19th century sailing canoe previously located in a salt marsh just north of Surf City, NC.

Blossom's Ferry Survey (Nov 1982), investigation and assessment of two previously located ferry sites (ca 1760 and 1800 respectively) in the Northeast Cape Fear River, NC. Both sites were measured, mapped, and scale models constructed to facilitate additional research.

HENRIETTA MARIE Project (June 1983-Present), a comprehensive archaeological and historical investigation undertaken during salvage operations under the auspices of Cobb Coin Co . The Henrietta Marie was an English merchant slaver that sank on New Ground Reef, Florida Keys (ca 1701).

Florida East Coast Shipwreck Project (July 1983-Present), a systematic survey, excavation and mapping of numerous wreck sites from Sebastian to Jupiter Inlets for Cobb Coin Co and under the auspices of the state of Florida. Sites include six 1715 Spanish Plate Fleet wrecks, San Martin (Spanish ca 1618), Spring of Whitby (English, ca 1826) and miscellaneous others.

1733 Spanish Plate Fleet Survey (Oct 1983/Present) , an ongoing independent research project carried out with Neptune Explorations, Inc. The structural remains of the San Pedro, El Lerri, El Infante, and Los Tres Puentes located along the upper and middle Florida Keys were recorded, mapped, and photographed. Assessments are being made for future investigations on these sites and others of the 1733 Fleet.

CITY OF VERA CRUZ Project (Feb 1985), surveyed and mapped for Shipwrecks, inc. the remains of a sail/steamer that foundered off Cape Canaveral, Florida (cal880).

URCA DE LIMA Project (May/Sept 1985), survey, excavation, and structural investigation of the remains of one of the 1715 Spanish Plate Fleet sites off Fort Pierce for the state of Florida. This and other efforts have resulted in making the site a protected Marine Archaeological Preserve and an underwater park for sport divers.

SAN JOSE Investigation (Sept 1985), survey, excavation, and structural investigation of the remains of a 1733 Spanish Plate Fleet site off Plantation Key for the state of Florida resulting in a comprehensive site plan and photomosaic.

ATOCHA Project (April 1986/Present), an ongoing research phase within a commercial salvage operation primarily on the structural remains of the Spanish galleons NUESTRA SENORA DE ATOCHA and SANTA MARGARITA which sank off the Marquesas Keys, Florida in 1622. Research conducted for Treasure Salvors, Inc and Cobb Coin Co., Inc.

Key Largo National Marine Sanctuary Shipwreck Survey (Apr and Sept 1986), surveys and archaeological workshops conducted in the sanctuary on the ca. 1868

wreck site known as the RIGGING wreck. Investigations were under the auspices of the National Oceanographic and Atmospheric Administration (NOAA), Marine Resources Development Foundation at Kobjick Marine Centre and the Atlantic Alliance for Maritime Heritage Conservation.

Pacific Galleon Project (June 1987), an investigation and examination of two Manila galleon sites and their associated material in the Commonwealth of the Northern Mariana Islands for Pacific Sea Resources, Inc. The SANTA MARGARITA sank off Rota ca 1601 and the NUESTRA SENORA DE CONCEPCION off Saipan ca. 1638.

TEACHING AND ACADEMIC EXPERIENCE

Instructor, New Bern River Survey (1981), field school sponsored by the NCUAB AND ECU's MHURP and designed to offer students an interdisciplinary introduction to the field of maritime archaeology.

Graduate Teaching Assistant (Aug 1981/May 1982), Special Studies Program, Dept of History, East Carolina University.

Graduate Research Assistant, Cape Lookout (NC) Shipwreck Survey 1982, field school conducted jointly by the NCUAB and ECU's MHURP.

Instructor and Site Supervisor (Apr/Sept 1986), Key Largo National Marine Sanctuary Shipwreck Survey and archaeological workshops under the auspices of NOAA, Marine Resource Development Foundation and the Atlantic Alliance for Maritime Heritage Conservation.

Instructor (May 1987), Advanced Dive Training Program (Shipwreck Archaeological Component) for the US Army Corps of Engineers, Florida Keys Community College, Key West, FL.

Adjunct Instructor (Oct 1987/present), Marine Archaeology Program, Florida Keys Community College, Key West, Florida. Various workshops and courses including Introduction to Marine Archaeology and the History of Ship Evolution.

Instructor (1984/Present), various workshops held around the country under the auspices of the Atlantic Alliance for Maritime Heritage Conservation.

OTHER PROFESSIONAL ACTIVITIES

Member, Board of Directors, Key West Maritime Historical Society.

Member, Advisory Council for the Marine Archaeology Program, Florida Keys Community College, Key West, Florida.

Contributing Editor, SEAFARERS - Journal of Maritime Heritage, Woodstock, Vermont.

Consultant, Wildwood Crest Historical Society - examination an assessment of possible structural remains of the brigantine NANCY located washing ashore at Wildwood Crest, New Jersey (1982/1983). The NANCY was destroyed in Old Turtle Gull inlet during the Revolutionary War and was possibly the first vessel to fly the "Stars and Stripes" in a foreign port.

Volunteer, Salvage excavation of the 17th, 18th, and 19th century dwellings and fortifications at Glouster Point, Virginia under the auspices of the Commonwealth of Virginia (Oct 1982). Operations

due to scheduled construction at the Virginia Institute of Marine Science.

Consultant, USS MONITOR Exhibit at the North Carolina Marine Resources Center, Bogue Banks. Photographs, diagrams, and artifacts on display from April to October 1982.

SOCIETIES, CONFERENCES AND AFFILIATIONS

Institute of Nautical Archaeology (INA)
Society for Historical Archaeology (SHA)/
Conference on Underwater Archaeology (CUA)
North Carolina Maritime Heritage Conference
Society of Bead Researchers
Port Bovisand Underwater Archaeology Symposium (England)
Key West Maritime Historical Society
Underwater Archaeology Symposium (Fort Lauderdale, FL)
The North American Society for Oceanic History (NASOH)
The Maritime Economic History Group
Atlantic Alliance for Maritime Heritage Conservation
Delta Sigma Phi Fraternity, North Carolina State University
Phi Alpha Theta, History Honor Society, East Carolina University

PRESENTATIONS, PUBLICATIONS AND RESEARCH PAPERS

1981 An Archaeological Survey and Evaluation at Fort Fisher State Historical Site and Vicinity : survey report submitted to US Army Corps of Engineers, Wilmington District and on file with N.C. Division of Archives and History co-authored with Funk, Sacchi, Erlandson, Lange, Lawrence, and Watts.

1982 U.S.S. FLORIDA - A Historical and Archaeological Perspective : research paper submitted to ECU and on file with the NCDAH.

1982 Submerged Cultural Resources Associated With Blackbeard the Pirate : research paper submitted to ECU and on file with the NCDAH.

1982 A Critical Review of the Cape Lookout National Seashore Management : research paper submitted to ECU and on file with the NCDAH and National Park Service.

1983 The Yorktown Cofferdam : Engineering Applications in Shipwreck Archaeology : research paper submitted to ECU and the Virginia Historical Landmarks Commission and on file with the NCDAH.

1983 A Preliminary Remote Sensing Reconnaissance of Tranters Creek, North Carolina : a survey report submitted to the NCDAH and on file with ECU.

1983 A Report of a Shipwreck Survey in the Vicinity of Cape Lookout, North Carolina : a field school survey report in progress.

1984 Archaeological Investigations on the English Merchant Slaver HENRIETTA MARIE : a paper presented to the 1st Atlantic Alliance for Maritime Heritage Conservation Shipwreck Conference, Mateo, North Carolina.

1984 The SAN MARTIN : Structural Analysis of an Early 17th Century

Spanish Nao : paper and underwater video (with Pat Cline) presented to the 1st Atlantic Alliance for Maritime Heritage Conservation Shipwreck Conference, Mateo, N.C.

1984 Preliminary, First , Second and Third Interim Report - Florida East Coast Shipwreck Project : reports submitted to the Florida Division of Archives, History and Records Management , co-authored with Mathewson, Fittipaldi, Cline Brantley, Elmore and others.

1985 Preliminary Assessment of the Structural Remains of the NUESTRA SENORA DE ATOCHA : research analysis report submitted to Treasure Salvors, Inc and on file with the Florida Division of Archives, History and Records Management.

1987 Heritage in Wood : A Preliminary Look at the Structural Evidence of the NUESTRA SENORA DE ATOCHA : research paper presented to the SHA Conference on Historical and Underwater Archaeology, Savannah, Georgia (Jan 1987).

1987 "The Archaeology of the SAN MARTIN : Preliminary Study of the 1618 Honduran Almirante," SEAFARERS - Journal of Maritime Heritage, Vol 1, Woodstock, Vermont.

1987 "The HENRIETTA MARIE - An Introduction to the First Slaver Studied in the New World," SEAFARERS - Journal of Maritime Heritage, Vol 1 , Woodstock, Vermont.

1987 "Key Largo National Marine Sanctuary Shipwreck Project," SEAFARERS - Journal of Maritime Heritage, Vol 1 , Woodstock, Vermont, co-authored with John Hales, Sanctuary Biologist.

1988 A Site Report and Overview : Research Aspects Concerning the Wreck Site of the Slave Ship HENRIETTA MARIE ca 1699 : research paper presented to the SHA Conference on Historical and Underwater Archaeology, Reno, Nevada (Jan 1988).

1988 Research Aspects Concerning the Site of an English Slave Ship - HENRIETTA MARIE 1699 : research paper presented to the 12th Annual Underwater Archaeology Symposium at Fort Bovisand, Plymouth, England (March,1988).

VITAE

Walter Zacharchuk
Post Office Box 4773
Key West, Florida 33040

PHONE:	Residence (305) 294- 6484 Work (305) 294- 3336
S.I.N.:	212-112-585
BORN:	July 21, 1935 - Kracow, Poland
PROFESSION:	Underwater and Ship Archaeologist
Present Position: 1987, January	For "Mel Fisher Maritime Heritage Society" Archaeologist and material culture research and conservation of artifacts from the sites of the "Santa Margarita" and "Neustra Senora De Atocha" c 1622 . Incumbent is also part-time identification of structural components of both ships.
Previous Position: 1985, August	Consultant on naval architecture to Resource Analyst, Inc. and Treasure Salvors, Inc, on the excavation/salvage of the ship, "Neustra Senora De Atocha" off Key West, Florida. Responsible for data retrieval and translation of same into drawing format.
1985, December	Consultant to the state of Delaware on excavation procedures to be used on the site of the "De BRAAK".
1986, July	Archaeological consultant to the state of Delaware and private investor on the salvage of the "De BRAAK". Responsible for design of lifting cradle and transfer of hull from barge to land where it was placed in holding tanks pending future treatment.
1979-84	Head, Underwater Research Liaison Officer, Parks, Canada, Archaeological Research Division, National Historic Parks and Sites Branch, 1600 Liverpool Court, Ottawa, Ontario KIA 1G2. Responsible for developing, maintaining liaison with divers, diving institutions, Provincial and Federal Government Departments conducting or contracting diving operations, as well as other personnel and groups in related fields.
1964-79	Fifteen years as Head, Underwater Research, Archaeological Research Division, National Historic Parks and Sites Branch 1600 Liverpool Court, Ottawa, Ontario KIA 1G2

My career in Underwater Archaeology began in 1964, when I made a presentation to officials of what is now the National Historic Parks and Sites Branch of Parks Canada on the threat to and the importance of preserving Canada's underwater archaeological heritage. As a result, I was hired to set up an underwater unit and auxiliary facility for Parks Canada. Initially, I directed all the technical aspects, (i.e. diving safety, equipment design, construction, purchase and maintenance, artifact processing facilities) and eventually took over direction of archaeological research as well. Above activity resulted in the creation of two ships museums of national importance.

Under my stewardship and the aegis of Park's Canada, we have excavated two shipwrecks of national historic significance. I have acted as archaeological consultant to the University of Pennsylvania, Southern Methodist University, the Texas Antiquity Commission, the State of Maine Historical Commission and numerous private organizations which were undertaking or considering underwater excavation of shipwrecks or other submerged historic and prehistoric sites.

During this period Park's Canada Underwater Research Team surveyed over 120 sites such as Historical Dock Installations, sites adjacent to National Historic and Natural Parks, however the majority were shipwreck sites which were endangered or of research importance.

Other Professional Experience.

Started diving commercially in 1951. From then until 1964, I carried out numerous contracts for police, harbor authorities, shipping agents, construction companies etc., primarily in the areas of rescue and underwater demolitions and construction. Some of the highlights of this work are:

- quantitative survey of pulp logs for Canadian Pulp and Paper Co., which resulted in a $3 million dredge built as a result of my recommendations;

- supervision for Lloyds of London of the salvage of a 24,000 ton vessel sunk in the shipping channel near Quebec City;

- demolition of vessel sunk in Montreal Harbor, a technically interesting problem because of the danger of using explosives in close proximity to other shipping and shore installations;

- extensive safety training including St . John's Ambulance first aid, Red Cross CPR, hyperbaric chamber operations and Royal Life Saving medal with bars;

- consultant to the Boys Club of Canada on water safety (Volunteer World);

- served as underwater hull inspector for J. R. Weir Ltd., Marine and Industrial

Engineering, International Driving Co., and Lloyds of London;

- held St. Lawrence Seaway pilot's ticket for vessels up to 2,000 tons (1958-62).

Photography: Photography & Macro-Photography.

I won second prize in 1971: "Les Artisans du Bas St . Laurent" contest; and many of my photos have been used for illustration of popular and professional publications such as newspaper articles, the Beaver, National Geographic and The International Journal of Nautical Archaeology, etc.

Air Compressors: Operation and Service.

High Pressure: Worthington, Mako (Bauer), Rix, Joy, Poseidon, Neruss, Etc . From 1.4 to 24 C.F.M .

Hydraulics: Pumps, Torque Generators, Motors, Valves, Power transfer, etc.

Innovations:

- Following departmental approval and in conjunction with Parks Canada Engineer staff I initiated an $800,000 modification project to convert our field camp into a artifacts treatment laboratory and dump scow into a unique self-sustained surface support base for or underwater archaeological excavations. After fourteen seasons the craft is still service.

- Fabricated new tools for use during re-assemble of cross-section of an 18th-century frigate now on exhibit in Restigouche P.Q. I was the architectural consultant of this project.

- I designed, modified and/or fabricated many other tools for on-site recording of excavation and artifacts.

- Conversion of existent machinery into an artifact processing apparatus. Received Suggestion Award.

- Design and fabrication of "Venturi Jet Induction Dredge" for underwater excav-tion. (Patented by Canadian Government)

- Designed and fabricated "Down Thrusters" from available machinery. Units are used to rapidly remove large quantities of overburden.

- Modified and fabricated lightweight air lifts for increased efficiency and manoeuverability on underwater excavations.

Publications: Fifteen publication in various international trade and professional journals.

Hobbies:
Woodworking
Furniture Reproduction
Pattern Making
Nautical Accoutrements Reproductions
Ships models
Internal Combustion Engine - Gas & Diesel

Membership in Professional Associations:

- Society for Historical Archaeology U.S.A.
- Canadian Sub-Commission for Maritime History
- Canadian Society for the Promotion of Nautical Research
- North American Society for Oceanic History Inc., U.S.A.
- The Nelson Delta Research Corporation
- Kendall Whaling Museum, U.S.A.
- The Canadian Nautical Research Society
- Seafarer Journal, Editorial Staff
- Mel Fisher Maritime Heritage Society

Alternate Education:

My professional archaeological training was perfected under the tutorship of Park's Canada Archaeologist on Land Site Excavations. Since, I have excavated two land sites, Coteaux Landing Canal, the first canal in North America, over 700 feet in length and a shipwreck survivors habitation in Hudson Bay, Northwest Territory. Expertise and knowledge related to my profession and personal interests in the field of underwater archaeology and artifact conservation were perfected through self-education and practical on the job experiences. Marine Archaeology and Underwater Excavations, both in existence as a field of research globally, only since 1961 c. I have functional knowledge of historic naval architecture and early Canadian history. I have acquired this knowledge through related subject research.

I have been awarded an honorary degree for research in underwater excavation and following contributions to material culture research and understanding of shipping practices during North America colonization period.

REFERENCES WILL BE SUBMITTED ON REQUEST

VITA

COREY MALCOM

Education:

1981 New Castle Chrysler High School, New Castle, IN

1985 B.A. Anthropology/Archaeology
Indiana University, Bloomington, IN

Employment:

Sept 1988 - Present

Mel Fisher Maritime Heritage Society Inc., Key West, FL

January 1988-August 1988

Pacific Sea Resources, Inc., Saipan, CNMI

May 1984 - December 1987

Resource Analysts Inc., Bloomington,IN / Key West,FL

Fieldwork:

1988 Excavation and data recovery at the site Nuestra Senora de La Concepcion, historic shipwreck, sank 1638. Project Archaeologist with Amanda L. Crowdy.

1986 Excavation and data recovery at the sites Nuestra Senora de Atocha and Santa Margarita, historic shipwrecks, sank in 1622. Assis tant Archaeologist; Dr. John T. Dorwin and R. Duncan Mathewson, Supervisors.

Archaeological Test Excavations in Posey Co., IN. Defined location of a Late Archaic/Early Woodland prehistoric site. Project Archaeologist.

Archaeological survey of two borrow pit locations in Fayette Co., IN. Located an early 19th century settler's site. Project Archaeologist.

Archaeological survey of a borrow pit location, Hendricks Co., IN. Located a non-diagnostic prehistoric site. Project Archaeologist.

1985 Archaeological survey of parcels within the Hoosier National Forest, IN. Located 43 historic and prehistoric sites. Assistant Archaeologist. John C. Claflin, supervisor.

Archaeological survey of transmission line right -of- way, Floyd Co., GA. Located three prehistoric sites. Project Archaeologist.

Archaeological survey of two parcels in Clermont, Co., OH at the Wm. H. Zimmer Station. Located 84 sites spanning the Paleo-Indian period to the mid-20th century. Field Technician.
Carol A. Ebright, project archaeologist.

Archaeological Excavation at four sites in Clermont Co., OH at the Wm H. Zimmer Station. Two prehistoric and two 19th Century historic sites excavated. Field Technician.
Kathleen M. Weikel, project archaeologist.

1984 Archaeological Excavation at four 19th century historic sites in Floyd Co., GA. Rocky Mountain Project. Field Technician.
Dr. Timothy B. Riordan, project archaeologist.

Laboratory Experience:

Present Conservation and analysis of materials recovered from shipwrecks Nuestra Senora de Atocha, Santa Margarita and Henrietta Marie.

1988 Cleaning, cataloguing, curation and charting of materials recovered from shipwreck Nuestra Senora de La Concepcion.

1987 Directed technicians in the cleaning, cataloguing, curation and charting of materials recovered from shipwrecks Nuestra Senora de Atocha and Santa Margarita.

Data recovery from structural remains of Nuestra Senora de Atocha in underwater laboratory at Florida Keys Community College.

1986 Preliminary onboard conservation of material recovered from Nuestra Senora de Atocha.

Cleaning,cataloguing, curation, and identification and Analysis of prehistoric materials recovered from test excavations in Posey Co., IN.

1985 Cataloguing and artifact identification of historic and prehistoric materials from sites in the Hoosier National Forest.

Cataloguing and identification of prehistoric materials recovered from survey in Floyd Co., GA.

Cleaning cataloguing and curation of historic and prehistoric materials from Wm. H. Zimmer Station, Clermont Co., OH.

Historic artifact analysis of materials from Wm. H. Zimmer Station, Clermont Co., OH.

1984 Cleaning, cataloguing and curation of historic

materials from Rocky Mountain Project, Floyd Co.,GA

Technical Reports:

1988 "A chemical Flotation Technique as applied to Sediment recovered from Nuestra Senora de Atocha". Report presented at 1988 Society for Historical Archaeology/Conference on Underwater Archaeology. On file at Mel Fisher Maritime Heritage Society, Key West, FL.

1987 "Mapping the Nuestra Senora de Atocha". Report presented at Historical Archaeology/ Conference on Underwater Archaeology. On file at Mel Fisher Maritime Heritage Society, Key West, FL.

1986 "Report on the results of Archaeological testing at site 12 Po 752, Posey County, Indiana" (RAI 1607). Submitted to Geosciences Research Associates, Inc. by Resource Analysts, Inc.

"Archeological Survey of a Proposed Borrow Pit in Washington Township, Hendricks County, Indiana" (RAI 1608). Submitted to Contractors United, Inc. by Resource Analysts, Inc.

1985 "Preliminary Report on Cultural Resource Inventories R-I and R-II at the Coosa River crossing of the Plant Bowen-Rocky Mountain Transmission Line, Floyd County, Georgia"(RAI 1599) Co-Author with Ellen Sieber. For submission to the Georgia Power Company by Resource Analysts, Inc.

VITA

ARCHEOLOGIST/CONSERVATOR

JAMES SINCLAIR

Home Address
1627 Seminary Street
Key West, Florida 33040
305-296-6307

Treasure Salvors,Inc.
200 Greene Street
Key West,Florida 33040
305-296-6533

PERSONAL:

Height: 5'10"
Weight: 200

Married: Yes
Health: Excellent

POSITIONS:

1988-Present — Curator/Conservator,
Cobb Coin Company, Inc. (1715 Spanish Vessels)

1987-Present — President, SAS. Inc.
Conservation Consultant to Jupiter Wrecks, Inc.

Adjunct Instructor Marine Archeology Florida Keys
Community College.

1985- Present — Consultant to Caribbean Marine Recovery Ltd.

Assistant Director,
National Center for Shipwreck Research Ltd.,
Key West Seaport, 631 Greene St. Key West, Florida

Conservation Consultant & Lecturer,
Alliance for Marine Heritage
Conservation, Washington, D.C.

1981-Present — Archeological Conservator, Treasure Salvors, Inc. (1622 Spanish Vessels, Santa Margarita and Nuestra Senora de Atocha; 1710 English vessel Henrietta Marie)

Archeological consultant to Mel Fisher in Antigua/Barbuda

EDUCATION:

B.A. Franklin Pierce College, Ringe, NH (Cum Laude Anthropology)

FIELD WORK:

1988 — Assessment of Civil War Period Sidewheel Steamer,
Pascagula, MS

1987 — Preliminary Survey of a Late 19th Century Wreck in the Key Largo Marine Sanctuary for Alliance for Maritime History Conservation, N.O.A.A.

1986 — Directed CEDAM International Expedition to St. Eustatius,

NA.

1985 Participant in Archeological Excavation of the Nuestra Senora de Atocha (1985-1987).

1984 Participated in Preliminary Survey of Vera Cruz Harbor and Adjacent Areas for USS Summers (1984-1987)

Preliminary Survey of Orangestead Bay, St. Eustatius, NA (1984-1985)

Archeological mapping of Spanish 1715 Plate Fleet Wrecks (SE Florida Coast 1984-1985)

Mapping and Assessment of revolutionary War Shipwrecks in Mullica River, NJ for Alliance for Maritime History Conservation and State of New jersey.

1981 Participated in Remote Sensing and Archeological Mapping of the Sites of the Santa Margarita and Nuestra Senora de Atocha (1981-1985)

Assisted in Raising Hull Segment of Santa Margarita.

AREAS OF SPECIALIZATION:

Conservation of Colonial Period Shipwreck Artifacts; Underwater Site mapping Magnetic and Acoustic Remote Sensing; Historical Research; Museum Design and Display; Historic Shipwreck Archeology; Artifact Analysis and Evaluation; Public Education Lecturer.

PUBLICATIONS:

1987 Children's Television Newtons Apple Segment #110 on Shipwrecks and Treasures

1986 "From Seabed to Showcase: The Conservation of Iron Objects", Seafarers Journal

PAPERS BEFORE PROFESSIONAL GROUPS:

1988 "Swords of the Atocha," 1988 Annual Meeting, Society of Historical Archeology/Council for Underwater Archeology, Reno, Nevada.

1987 "Silver from the Atocha: A glance at Merging Spanish/Indian Artistic Traditions," 1987 Annual Meeting, Society of Historical Archeology/Council for Underwater Archeology, Savanna, Georgia.

Professional affiliation SHA-CUA NAS. A.I.C.

EXHIBITION EXPERIENCE:

1986 Children's Museum, Indianapolis, Indiana

1983 Developed Permanent Exhibits at treasure Museum, Key West, Florida.

1982 Convention center, Mallory Square, Key West, Florida (October).

Custom's House, Baltimore, Maryland (May).

Martello Museum, Key West Art and Historical Society, Key West, Florida (February)

1981 Museum of Science, Jacksonville, Florida (through January 82).

Queens Museum and Chase Manhattan Bank, Flushing Meadows, New Jersey (September-October).

National Geographic Society, Explorer's Hall, Washington D.C. (May-June).

MILITARY:

None

FOREIGN TRAVEL AND LANGUAGE:

Mexico, Caribbean, Canada, Indonesia, Australia

LANGUAGE: Spanish

References furnished upon request.

CURRICULUM VITAE

BRUCE CHAPPELL

I. PERSONAL INFORMATION

Name: Bruce Stephen Chappell

Birth: Aug. 5, 1947, Gainesville, Fla.

Address: 2810 N.E. 12th St., Gainesville, Fla. 32609

Telephone: (904) 373-6132 (home)
(904) 392-0319 (work)

Marital status: married with 3 children

Present position: Archivist, Spanish Florida (since 1974)
Borderlands Program,
P. K. Yonge Library of Florida History,
University of Florida
Gainesville, Florida.

II. EDUCATION

Bachelor of Arts in History and Political Science, University of Florida, 1969.

Master of Arts in History (Archives), University of Florida, 1982.

III.MILITARY SERVICE

Active Duty, US Army, (1970-1972)
Vietnam service (1971)
Honorable discharge (1976)

AWARDS

Bronze Star (1971)
ARCOM (1971)

IV. PUBLICATIONS

"Visit to the Indian Nations: the Diary of John Hambly", Florida Historical Quarterly (July, 1976) (with Daniel J. J. Ross)

"Spanish Manuscript Sources of the Florida Borderlands in the P. K. Yonge Library of Florida History" Latinamericanist (March, 1977)

"A New Guide to Sources of Spanish Florida History" Florida Historical Quarterly, (April, 1978)

"New Access to the History of Spanish Florida: The Spanish Florida Borderlands Project", El Escribano (Dec. 1978)

Calendar of the East Florida Papers, 1784 - 1821, P. K. Yonge Library of Florida History, 1978 (52,000 cards)

Calendar of the Stetson Collection, 1518 - 1821, P. K. Yonge Library of Florida History, 1977 (13,000 cards)

Calendar of the Papeles Procedentes de Cuba held in the P K Yonge Library of Florida History, P. K. Yonge Library of Florida History, 1981, (80,000 cards).

Fuentes para la Historia Social de la Florida Espanola (1600 - 1763), Bruce S. Chappell et al, Comite Conjunto Hispano-Norteamericano para la Cooperacion Cultural y Educativa, Madrid, 1988.

V. PAPERS PRESENTED:

"The Spanish Period Manuscripts of the Florida Borderlands in the P. K. Yonge Library of Florida History" First Conference on Jacksonville History, Feb. 1977. Jacksonville, Fla.

"The History of the Diego Plains" St. Augustine Historical Society, 1978, St. Augustine, Fla.

"Problems and Solutions for the Organization and Conservation of the Holdings of the St. Augustine Historical Society" 1979, St. Augustine, Fla.

"The Spanish Florida Borderlands Program of the University of Florida Libraries" Spain and the United States: A Panorama of Relations. International Symposium, 1979, Gainesville, Fla.

"Spanish Florida History on the St. Johns River: Where and How to do it", Seminar, Jacksonville University, Nov. 1981, Jacksonville, Fla.

"Horse Races at the Cowford: Sources for the Study of History Along the St. Johns River" Jacksonville Historical Society, Nov. 1981, Jacksonville, Fla.

"Sources for the History of Spanish East Florida, 1784 - 1821", Beaches Area Historical Society, Pontevedra, Fla. 1982.

"Fuentes Para la Historia Espnaola de la Florida", Series of Seminars, Universidad de Sevilla, 1983 - 1985, Sevilla, Spain.

"Day to Day Lives: the Social History of Spanish East Florida through the East Florida Papers" Symposium, "Clash Between Cultures" St. Augustine, Fla. 1985.

VI. ARCHIVAL/RESEARCH EXPERIENCE:

Archives: Spain (10 research visits between 1979 and 1989)

Archivo General de Indias
Archivo General de Simancas
Archivo Historico Nacional
Archivo Militar, Segovia
Biblioteca Nacional, Madrid
Archivo de Protocolos de Madrid
Museo Naval, Madrid
Real Academia de Historia, Madrid
Archivo de Protocolos de Sevilla
Archivo de Protocolos de Cadiz

Archives: Cuba

Archivo Nacional de Cuba, Havana
Archivo del Arzobispado de la Havana
Museo de la Ciudad, Havana
Biblioteca Nacional "Jose Marti", Havana
Archivo del Obispado, Matanzas

Archives: Mexico

Archivo General de la Nacion
Biblioteca Nacional
Archivo del Estado de Hidalgo
Archivo del Estado de Mexico
Archivo del Estado de Puebla
Archivo del Arzobispado de Puebla
Archivo del Estado de Veracruz

VII. SPECIAL SKILLS:

Languages:

Spanish (reading, writing, speaking, fluent)
Portuguese (reading, writing, speaking, good)
French (reading, fair)

Paleography: Spanish and Portuguese, sole instructor at University of Florida.

REFERENCES:

Dr. Paulino Castaneda Delgado
Director, Departamento de Historia de America
Universidad de Sevilla
Sevilla, Spain

Dr Rosario Parra Cala
Directora, Archivo General de Indias
Sevilla, Espana

Dr. Nettie Lee Benson
Librarian Emerita
Nettie Lee Benson Latin American Collection
University of Texas at Austin
Austin, Texas

CURRICULUM VITAE

PHILIP MASTERS

PO Box 14668
University Station
Gainesville, FL, 32604
Phone 904-371-4824

April 1989 to Present:	Shipwreck research in the major archives in Europe & the U.S.
January 1989 to Apr 1989	Training at University of Florida in Spanish Paleography (The reading of older manuscripts)
April 1984 to Dec1988	Wholesale jewelry sales, Southeast Chain & Charm, Maitland,FL. Top producer and Salesman of the year, 1985 and 1986 .
June 1979 to Apr 1984	Wholesale jewelry sales, L & M Jewelers Inc, Hallendale, Fl. Sales to Jewelry Chain Stores throughout the Eastern US.
Sept 1978 to May 1979	Wholesale jewelry sales, Davidson, Inc, Miami, Fl. Sales at the Home Office and Sales Rep. in NYC.
July 1972 to Sept 1978	Wholesale electrical supply management and sales, Kennedy Electrical Supply Corp, Jamaica, Newburgh, and Hauppauge, N.Y. Vice President and Branch Manager.
October 1971 to July 1972	Registered Representative (Stockbroker), Bruns, Nordeman & Co. N.Y.C.
June 1966 to October 1971	Registered Representative (Stockbroker), Dreyfus & Co. (Later Moore, Schley, Cameron & Co.). N.Y.C.
Sept 1964 to June 1966:	Store Manager, Everyone's Bargain Stores, Inc, Brooklyn, N.Y.
April 1959 to Nov 1963:	Various Store management Positions, Masters Stores Inc, in New York and Florida.
Feb 1958 to Apr 1959:	Undergraduate at N.Y.U. School of Commerce, N.Y.C.
Aug 1957 to Feb1958:	Active Duty, U.S.M.C., at both Parris Island, S.C., and Camp Leluene, N.C. Honorably Discharged from Reserves in 1962.
Sept 1955 to June 1957:	Undergraduate at Princeton University, Princeton, N.J.

Major Archives Visited in the last Five Years:

In the U.S:

American Antiquarian Society	Worchester, MA.
Colonial Williamsburg Foundation	Williamsburg, VA.
Florida Atlantic University	Boca Raton, FL.
Hispanic Society of America	New York City
Library of Congress	Washington, D.C.
Massachusetts Historical Society	Boston, MA.
Massachusetts State Archives	Boston, MA.
National Archives	Washington, D.C.
New York Historical Society	New York City
New York Public Library	New York City
New York State Archives	Albany, NY
North Carolina State Archives	Raleigh, NC.
South Carolina State Archives	Columbia, SC.
University of Florida	Gainesville, FL.
University of Miami	Miami, FL.
University of North Carolina	Chapel Hill, NC.
University of South Florida	Tampa, FL.
Virginia State Archives	Richmond, VA.

In other countries:

Archivo General de Indias	Seville, Spain
British Museum	London, England
Canadian National Archives	Ottowa, Canada
Library of Parliament	Ottowa, Canada
National Maritime Museum	Greenwich, Enqland
Public Record Office	London, England

Invited to make presentations at:

National Convention of the American Numismatic Association in Atlanta in August 1987.

Christie's, New York City in February, 1989.

Shipwreck Convention of the Americas in Key West in July, 1989.

Author of a historical monograph published in Christie's Catalogue for the auction of the Coins of HMS Feversham in February, 1989.

APPENDIX B - EQUIPMENT SPECIFICATIONS

GPS - GLOBAL POSITIONING SYSTEM

MAGELLAN
SYSTEMS CORPORATION

Appendices

ALL ABOUT THE GLOBAL POSITIONING SYSTEM

GPS — WORLDWIDE NAVIGATION FROM A NEW PERSPECTIVE

The concept of a highly accurate, worldwide navigation and positioning system that could be used continuously at any time of the day began with the Department of Defense. It envisioned radio signals transmitted from a satellite constellation, a system that would not be fraught with the limitations of existing navigation technologies.

Their vision was realized with the Global Positioning System which was made possible by rapid advancements in aerospace technology, a firm financial commitment from the U.S. government, and the intense participation of individuals and corporations with communications expertise.

The heart of the Global Positioning System is a constellation of satellites which will eventually consist of 21 satellites and 3 working spares in six orbital planes. Circling the Earth twice daily, each satellite is in a fixed orbit, approximately 10,900 nautical miles above the surface of the earth, inclined at 55 degrees from the equator.

This new navigation infrastructure, though primarily designed for the U.S. military, is available to a variety of worldwide users including recreational boaters, fishing and shipping fleets, general and commercial aviation aircraft, and surveyors and engineers. Recent technological innovations have made GPS worldwide navigation an affordable reality.

The information provided is precise and transmitted in real time. The most accurate, on-demand worldwide navigation system, GPS is extremely resistant to interference from weather and earth-based radio signals.

All of these advantages make GPS greatly superior to any other navigation system.

Satellite Navigation Made Simple

Navigation by Satellite on Demand.
Each GPS satellite continuously transmits two types of orbit data used to calculate a position: Almanac and Ephemeris. Listening to only one satellite, a GPS receiver can gather the Almanac information, which contains the approximate location of every satellite in the system. From the Almanac, the receiver determines which set of satellites will give the best geometries. The better the geometry, the more accurate the position fix. The Ephemeris data is more precise and is used in obtaining the exact position of each satellite.

In addition to this information, two codes are transmitted: a protected code (P-Code) and an unprotected code (C/A Code). The P-Code is more accurate and is reserved for military use; the C/A Code while intended for public access is also used by the military.

The C/A code has two purposes. It provides immunity of the signal to interference from undesired signals. Secondly, the C/A code is used in determining the precise range of the user from each satellite—the first stage in calculating a position fix.

"Reading" Satellite Information.

While the Global Positioning System may appear complex, navigation with GPS can be amazingly simple. A well-designed GPS receiver uses the signal information in a fundamental geometric equation. It solves the equation and presents it in easy-to-use navigation displays.

To obtain a position fix, a minimum of three satellites are "read" (2D). First the receiver determines the time of transmission and reception of the signal from each satellite. It then multiplies the difference in these times by the speed of light (186,000 miles per second) to arrive at an estimate of the satellite's distance from the receiver.

Using the calculated distance and the calculated orbital position of each satellite, the receiver determines and displays a position fix in degrees of latitude and longitude. Exact time of that fix, accurate to one ten-millionth of a second can also be determined. Although accuracy varies somewhat with satellite constellation geometry, a position fix accuracy of 25 meters or better is typical with C/A code receivers.

Monitoring and Controlling GPS.

A master control station operated by the Air Force in Colorado, USA gathers pertinent navigation data from the satellite constellation. This dedicated facility is especially equipped for satellite monitoring, telemetry, tracking, command and control, data uploading, and navigation message generation.

Monitor stations and ground antennas strategically located around the world passively track the GPS satellites relaying data to the master control station. Through the monitor stations, exact satellite position and signal-data accuracy are constantly updated and maintained.

The master control station routinely adjusts minor discrepancies between where the satellite "thinks" it is and where the monitor stations "know" it is. The compensations are relayed to a ground antenna which then transmits the correction to the appropriate satellite.

If for any reason a satellite emits erroneous data or is otherwise not operating properly, a ground station will mark it "unhealthy" and the satellite will broadcast this fact to the user. Receivers are programmed to ignore the unhealthy satellites, "reading" instead the next best satellite for determining the user's position. The master control station also has the ability to degrade the satellite data. Such degradation, called SA for Selective Availability, would cause positioning errors to increase beyond the 25 meter level.

GPS Brings New Navigation Horizons.

GPS is the technology of the future. Based on ingenuity and vanguard capabilities, GPS will replace systems based on technologies developed decades ago. GPS is superior to other systems in its accuracy, coverage, and resistance to interference.

Accuracy.

The most remarkable feature of the Global Positioning System is its accuracy. Position accuracies of 25 meters or better are commonly obtained from C/A code GPS receivers. Repeatable accuracy, that is being able to return to the same spot, is a hallmark of GPS navigation.

Coverage.

The completed GPS constellation of 21 satellites plus spares will provide 24-hour continuous 3D coverage world-wide. It is not necessary to wait for the full constellation since, theoretically, only 12 satellites are needed for 24-hour coverage for boaters who already know their altitude. Also, unlike other electronic navigation systems, the signal never weakens because of distance from the broadcast source, or the number of users.

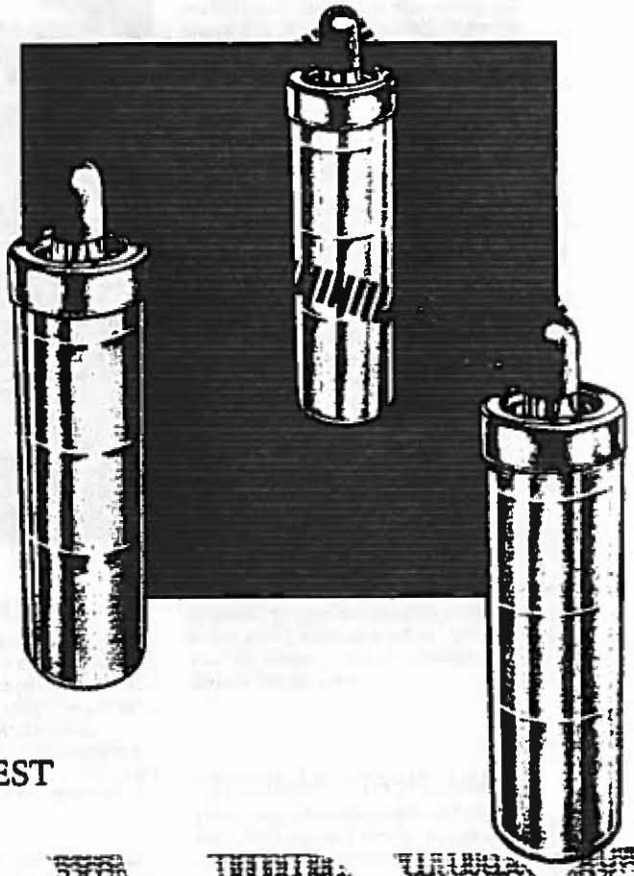
Interference.

Another remarkable feature of GPS is its resistance to interference from conditions which disturb other electronic navigation systems: thunder, lightning, heavy weather, other radio signals, on-board electronics, passing ships, on-shore electronic installations, ignition of the boat engines, portable radio receivers, and so forth, do not, in general, affect the GPS signal.

The high frequency (1575MHz) used by GPS means that it operates in a wave environment where there is less interfering radiation. More important, GPS uses spread spectrum technology which greatly reduces any possible interference in its navigation signal.

SHARPS ACOUSTIC POSITIONING SYSTEM

PINPOINT ACOUSTIC POSITIONING



MARQUEST GROUP

SHARPS

SONIC HIGH ACCURACY and POSITIONING SYSTI

Optimized for accuracy rather than range, SHARPS achieves an order of magnitude of greater precision than longer range systems and is almost immune to multipath effects. These features, coupled with its low cost, rugged design and ease of use make SHARPS the system of choice for precision underwater survey, tracking and navigation. If you need precise underwater positioning you should be using SHARPS.

PRECISION

SHARPS rms position error is less than 2 cm at 100 meters range. This unique level of accuracy is attained by using a broadband acoustic pulse centered at 300 kHz which, while limited to little more than 100 meters range, permits extremely precise and repeatable measurement of acoustic travel times. Speed of sound can be very accurately calibrated over 100 meters, yielding sub-centimeter range resolution. This resolution is preserved by carrying out all calculations with 16-bit precision.

UPDATE RATE

SHARPS can provide position data at an update rate of 10 samples per second at 100 meters range. This will allow some users to trade off bandwidth for additional accuracy by averaging or low-pass filtering the data while giving others the navigation bandwidth needed for ROV tracking and control.

MULTIPATH IMMUNITY

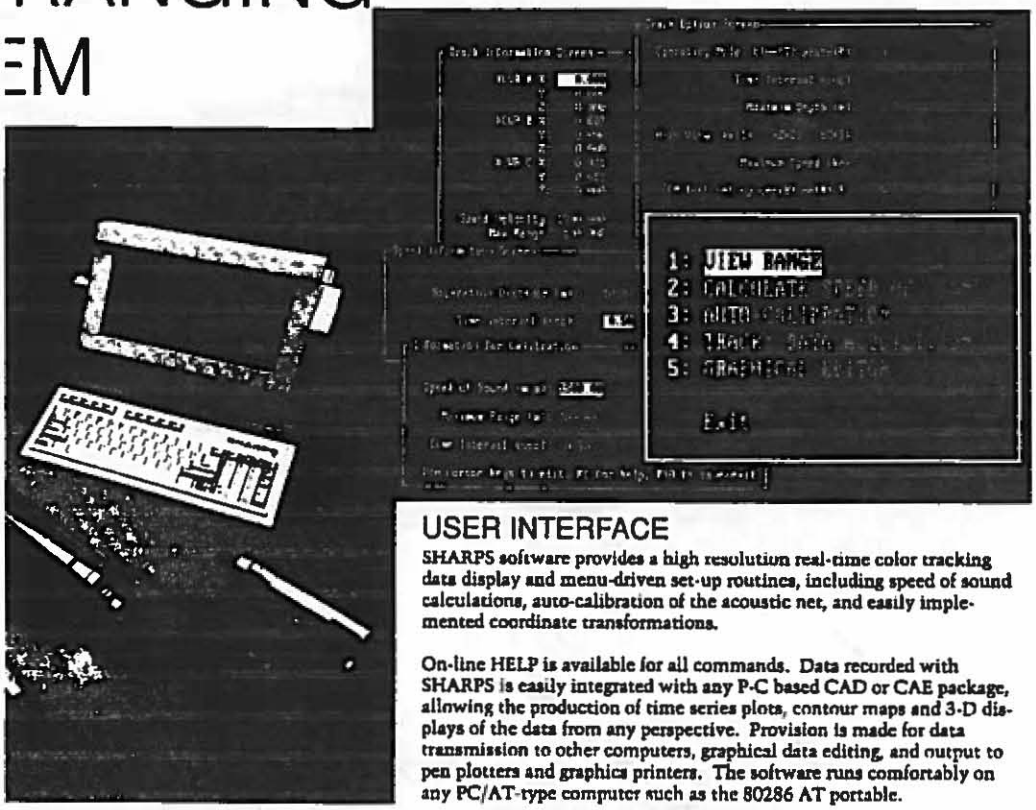
At 300 kHz signal echos die out quickly, SHARPS is almost immune to multipath interference. SHARPS has been sucessfully applied in highly echoic environments such as exist around ship hulls and piers or in steel tanks where long range systems have been unable to operate.

TRACKING CONFIGURATIONS

Three or more cabled transceivers are used to form an acoustic grid from which one or more transceivers carried by a diver or an ROV can be tracked. The tracked transceiver can be operated as a wireless transponder or as a hardwired responder on a cable identical to those used for the net, or on a twisted shielded pair in a vehicle tether. The acoustic grid can be configured in either a long or short baseline mode, so that tracking can be relative to a transceiver network fixed to the bottom, to a stationary stucture or to a moving vehicle.

Integrated pitch, roll, heading and depth sensors are available as options. A diver trigger is available which allows a diver to perform precision underwater surveys by touching the transceiver tip to the desired locations and initiating a position fix.

RANGING
EM



USER INTERFACE

SHARPS software provides a high resolution real-time color tracking data display and menu-driven set-up routines, including speed of sound calculations, auto-calibration of the acoustic net, and easily implemented coordinate transformations.

On-line HELP is available for all commands. Data recorded with SHARPS is easily integrated with any P-C based CAD or CAE package, allowing the production of time series plots, contour maps and 3-D displays of the data from any perspective. Provision is made for data transmission to other computers, graphical data editing, and output to pen plotters and graphics printers. The software runs comfortably on any PC/AT-type computer such as the 80286 AT portable.

FIELD ENGINEERING

Cable lengths up to 500 meters are available. The standard cables and transceivers have a rated depth of 300 meters. Cables have 1000 lb. breaking strength, abrasion resistant nylon braid jacketing and high quality connectors. Transceivers are available with heavy duty stainless steel or lightweight plastic pressure housings.

Optional deep water transceivers and cables are available for depths to 2000 meters, as are bottom mounting tripods with acoustic release buoys and a subsea computer housing. Power consumption is low, and the whole system can be operated from a small portable generator or ROV power supply bus. All equipment is provided with rugged shipping and deployment cases and backed up by Marquest's experienced underwater systems engineering staff.

SHARPS
SERIES 5100

Marine Telepresence
a division of
MARQUEST
GROUP

SPECIFICATIONS

TRANSCEIVERS

Weight:	1.0 kg. in air (35.27 oz)
Case Material:	Stainless steel
Power:	28 Vdc @ 25 ma (from SHARPS power supply)
Frequency:	300 kHz (+/- 10%)
Transducer:	Piezoelectic ceramic hemisphere
Maximum Range:	100 m (328.1')
Range Resolution:	< 5 mm (.19")
Slant Range Precision:	< +/- 2 cm @ 100 m

CONTROL BOARD

Weight:	.27 kg (9.5 oz.)
Power:	Power supplied by host + 5v @ .75a (750 ma.) 12v @ .25a (25 ma.)
Size:	34.3 cm x 12.7 cm x 2.24 cm (13.5"x 5.0" x .88")
Range Clock Frequency:	14.32 MHz
Range Clock Resolution:	16-bit
Pulse Length:	< 8 cycles

CABLES

Standard Length:	100 m (328.1')
Maximum Lenght:	304.8 m (1000')
Internal:	Rg-58 Coaxial
External:	Nylon abrasion jacket strain relief

COMPUTER REQUIREMENTS

PC Compatible

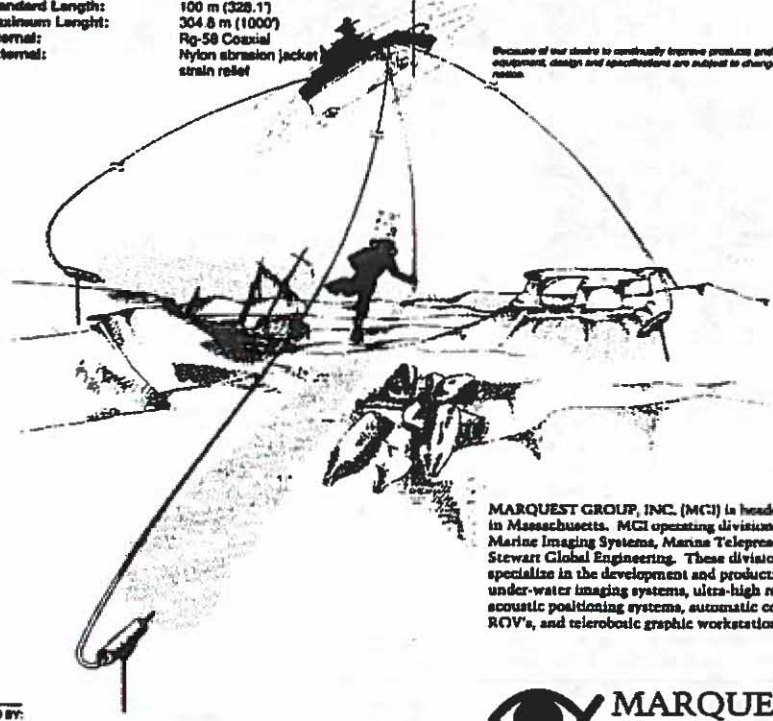
SOFTWARE

Graphics Capabilities	EGA seven color or CGA
Real Time:	Data Display Axis Change Zooming Capabilities Communications port interface
Automatic Calibration:	Speed of Sound Transceiver Net
Data Storage:	ASCII Files Raw Time Delay 3-D Position
Data Rates:	10 Hz
Diagram Display Injection	
Data Editing	

ENVIRONMENTAL

All Units:	0-50 C operating -55 to 70 C non-operating
Depth Rating:	500 m (1640.4')

Because of our desire to continually improve products and equipment, design and specifications are subject to change without notice.



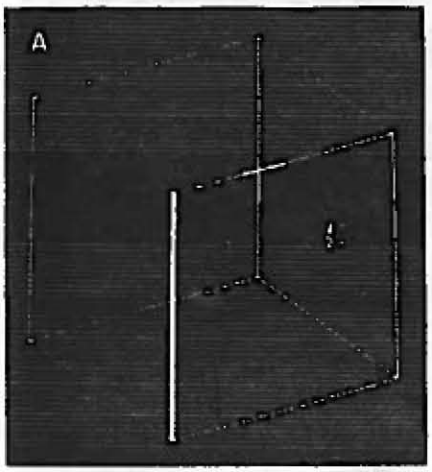
MARQUEST GROUP, INC. (MGI) is headquartered in Massachusetts. MGI operating divisions are Marine Imaging Systems, Marine Telepresence and Stewart Global Engineering. These divisions specialize in the development and production of under-water imaging systems, ultra-high resolution acoustic positioning systems, automatic control of ROV's, and teleroboaic graphic workstations.

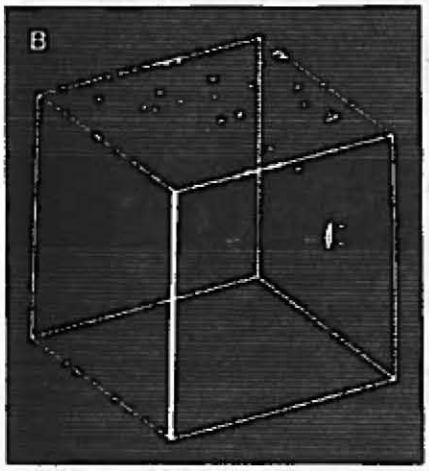
REPRESENTED BY:

MARQUEST GROUP

8 Otis Park Drive, Bourne, MA 02532
Tel. (508) 759-1311 • Fax (508) 759-1595

CAD/CAM APPLICATION TO A SHIPWRECK





AutoCAD Reveals the Pandora

This series of screen images is an example of the grid/site modelling method employed currently on the Pandora expedition. It shows the development of the particular two-metre square cell called Grid-32, located right by the Pandora's sternpost.

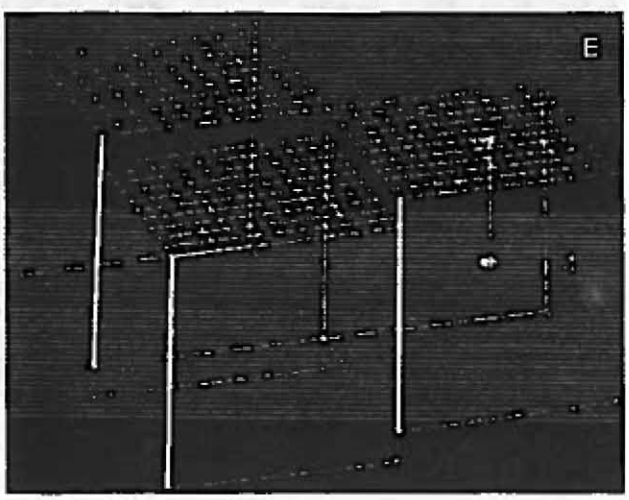
The first photograph (*A*) shows artifact distribution within cell Grid-32. Simplified drawings are used to speed up processing in the field. However, because volume data is correct, detailed artifact drawings could be substituted at a later date if desired. Different colours are used for materials of different archaeological type. The white lines show the cell outline and vertical reference pole of the prototype cell drawing which, with the horizontal reference net and grid reference number (not showing) can all be controlled independently.

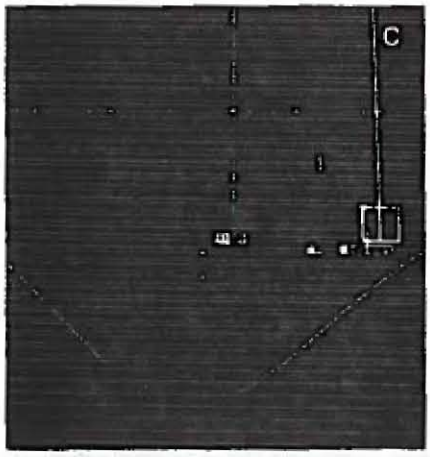
The second image (*B*) shows the same cell Grid-32, as before but with "shadowed" 2D artifacts and attached reference "strings", reflected on the cell's zero datum. These aid visual understanding and help overcome the problem of optical illusions created by the cells' lack of perspective foreshortening (in this version of AutoCAD).

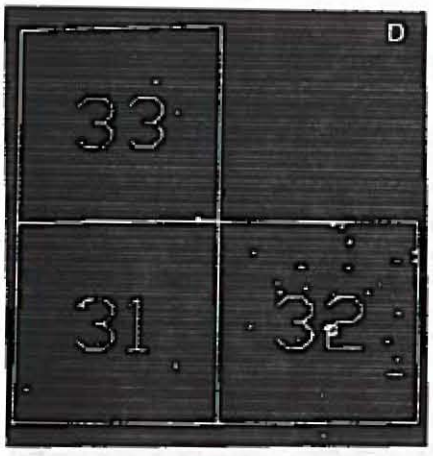
The third photograph (*C*) is a profile view of the 3D cell Grid-32 showing artifact placement and thickness in cross section. It includes a seabed level (top yellow line) and excavation level (bottom concave yellow line).

Fourth in the series (*D*) is a composite of cells Grid-31, Grid-32 and Grid-33 in plan view. Note at the bottom, the oval green object is only partly within the cell but assigned (arbitrarily) to it. Its reference string is in fact outside the cell's datum, a minor anomaly also visible in (B).

The next screen image (*E*) is a composite 3D view of the same three grid





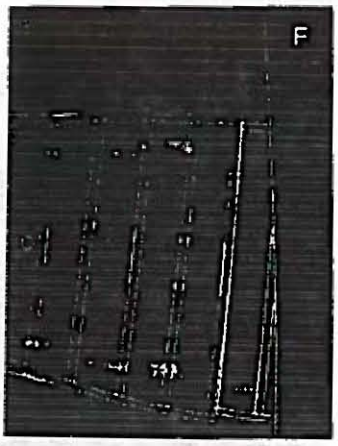


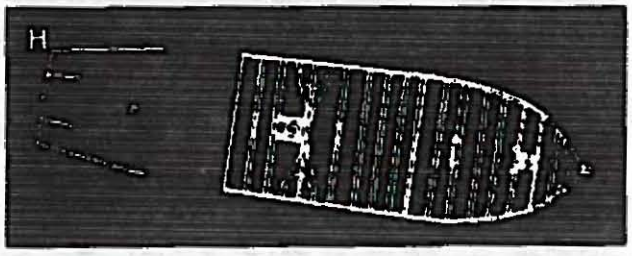
cells showing the horizontal reference net of 20 cm squares available at the zero datum of each cell. This allows for a quick visual measurement of artifacts' (X,Y) coordinates and it produces a visual horizontal reference. Note the 20 cm step-down of Grid-31, demonstrating how modelled grids may be stepped in exactly the same manner as real on-site grids.

The sixth photograph (*F*) is a windowed view of the stern of the Pandora site including the same three grid cells with their reference numbers showing, as in (*D*). The Pandora's lower deck configuration has been superimposed in a "best fit" position based on surface material and test trenches. In addition to the stern-post sheathing and conglomerate materials, the Pandora's anchor is visible on the surface at this point as a green outline under the port quarter breadbin. Its odd location, in the stern rather than in the bow, makes it likely that this was the Bounty's anchor that Captain Edwards' log remarks he recovered at Tahiti.

A wider view (*G*) includes the entire ship's outline with all the grid outlines near the stern visible and the horizontal reference nets for the three particular cells making them appear almost white at this level of detail. The blue and mauve stepped lines passing under the vessel represent generalised one-metre contours: there is a three-metre seabed rise from (0,0) to (50,20).

The last screen photograph (*H*) is a view of the 10 cm reference contour lines overlaying the position of the Pandora lower deck drawing. Note that the contour lines tend to follow the outline of the ship. This contour overlay was the last item developed and projected onto the site, tending to confirm the "best fit" position previously selected. □





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TELEPHONE 477 7857

Attorneys for Plaintiff

DISTRICT COURT OF GUAM

TERRITORY OF GUAM

ROBERT MARX, Plaintiff, vs. TWO WRECKED AND ABANDONED VESSELS, ETC., Defendants. and DAVEY JONES ARCHAEOLOGY, LTD., Claimant.	CIVIL CASE NO. 87-00036 MASTER INVENTORY OF ARTIFACTS RECOVERED FROM PILAR WRECKSITE

Exhibit Number	Artifact Description	Date Recovered
A.	**Pre Arrest:**	
1	26" x 2" Iron Drift Pin	06/13/87
2	18-3/4" x 1" Iron Drift Pin	06/13/87
3	16" x 1-½" Twisted Iron Drift Pin	06/13/87
4	19" x 1-½" Iron Drift Pin	06/13/87
5	Square Bronze Spike 7-½" x ½"	06/13/87
6	10" x ½" Iron Ship Nail (bent at 6" mark	06/13/87
7	10" x ½" Iron Ship Nail (bent at 6" mark	06/13/87
8	10" x 1" Iron Ship Nail	06/13/87

Exhibit Number	Artifact Description	Date Recovered
9	9-½" x 1-½" Iron Ship Nail	06/13/87
10	7-½" x ½" Iron Ship Nail	06/13/87
11	4-½" x ½" Iron Ship Nail	06/13/87
12	6-½" Iron Drift Pin Fragment	06/13/87
13	Iron Barrel Hoop Fragment, 11" x 1-½"	06/13/87
14	15" x 3-½" Shard of Spanish Red Earthenware	06/13/87
15	4-½" x 5" Spanish Red Earthenware Shard	06/13/87
16	3-½" x 3-½" Shard of Spanish Red Earthenware	06/13/87
17	4" x 4-½" Shard of Spanish Red Earthenware	06/13/87
18	3" x 1-3/4" Shard of Spanish Red Earthenware	06/13/87
19	2" x 2" Shard of Spanish Red Earthenware	06/13/87
20	1-½" x 1-½" Shard of Spanish Red Earthenware	06/13/87
21	4-½" x 2-½" Shard of Spanish Red Earthenware with partial base	06/13/87
22	2" x 3/4" Shard of Spanish Red Earthenware	06/13/87
23	3" x 2" Shard of Spanish Red Earthenware	06/13/87
24	2" x 2" Shard of Spanish Red Earthenware	06/13/87
25	3-½" x 1" Shard of Spanish Red Earthenware	06/13/87
26	2-½" x 2-½" Shard of Spanish Red Earthenware with rim	06/13/87
27	2-½" x 3" x 4-½" trianglar shaped Shard of Spanish Red Earthenware	06/13/87

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Exhibit Number	Artifact Description	Date Recovered
28	2-¼" x 2-¼" x 3" Cubed-shaped Fire Brick Fragment	06/13/87
29	1" x 3-½" Ballast Stone	06/13/87
30	3'7" x 1" Iron Drift Pin	06/14-19/87
31	2'10" x 1" Iron Drift Pin	06/14-19/87
32	2'4" x 1" Coral encrusted Iron Drift Pin	06/14-19/87
33	2'5" x ½" Coral encrusted Iron Drift Pin	06/14-19/87
34	2'8-3/4" x 1" Iron Drift Pin with coral encrustation	06/14-19/87
35	3'6" x ½" Drift Pin with coral encrustation	06/14-19/87
36	2'3" x ½" Iron Drift Pin	06/14-19/87
37	3' x 5-½' x ½" Iron Drift Pin	06/14-19/87
38	1'10" x ½" Iron Drift Pin with coral encrustation	06/14-19/87
39	1'8" x 1-½" Iron Drift Pin with coral encrustation	06/14-19/87
40	1'7-½" x 1-½" Iron Drift Pin	06/14-19/87
41	1'8-½" x ½" Iron Drift Pin	06/14-19/87
42	1'8-½" x 1" Iron Drift Pin	06/14-19/87
43	1'7-½" x ½" Iron Drift Pin	06/14-19/87
44	1'8" x 1" Iron Drift Pin	06/14-19/87
45	1'9-½" x 1" Iron Drift Pin	06/14-19/87
46	1'3-3/4" x 1" Iron Drift Pin	06/14-19/87
47	1'4-½" x ½" Iron Drift Pin	06/14-19/87
48	1'2" x 1" Coral encrusted Iron Drift Pin	06/14-19/87
49	1'1-½" x ½" Iron Drift Pin	06/14-19/87

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Exhibit Number	Artifact Description	Date Recovered
50	11-3/4" Iron Drift Pin	06/14-19/87
51	10" x ½" Bent Iron Drift Pin	06/14-19/87
52	10-3/4" x ½" Iron Drift Pin	06/14-19/87
53	9" x 1" Iron Drift Pin	06/14-19/87
54	8-½" x ½" Iron Drift Pin	06/14-19/87
55	7-½" x ½" Iron Drift Pin	06/14-19/87
56	7-½" x ½" Iron Drift Pin	06/14-19/87
57	5" x ½" Iron Drift Pin Fragment	06/14-19/87
58	3-½" x ½" Iron Drift Pin Fragment	06/14-19/87
59	3" Iron Drift Pin Fragment	06/14-19/87
60	4" Squared Bronze Spike	06/14-19/87
61	Small 2" Ballast Stone	06/14-19/87
62	Small 2" Ballast Stone	06/14-19/87
63	Small 2" Ballast Stone	06/14-19/87
B. Post Arrest:		
64	Large Ballast Stone	07/03/87
65	Large Ballast Stone	07/03/87
66	Large Ballast Stone	07/03/87
67	Medium Ballast Stone	07/03/87
68	Medium Ballast Stone	07/03/87
69	Medium Ballast Stone	07/03/87
70	Medium Ballast Stone	07/03/87
71	Medium Ballast Stone	07/03/87
72	Small Ballast Stone	07/03/87
73	Small Ballast Stone	07/03/87
74	Small Ballast Stone	07/03/87

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Exhibit Number	Artifact Description	Date Recovered
75	Small Ballast Stone	07/03/87
76	Small Ballast Stone	07/03/87
77	Small Ballast Stone or Ballast Stone Fragment	07/03/87
78	Small Ballast Stone or Ballast Stone Fragment	07/03/87
79	Small Ballast Stone or Ballast Stone Fragment	07/03/87
80	Small Ballast Stone or Ballast Stone Fragment	07/03/87
81	Small Ballast Stone or Ballast Stone Fragment	07/03/87
82	Small Ballast Stone or Ballast Stone Fragment	07/03/87
83	Small Ballast Stone or Ballast Stone Fragment	07/03/87
84	Small Ballast Stone or Ballast Stone Fragment	07/03/87
85	Small Ballast Stone or Ballast Stone Fragment	07/03/87
86	Small Ballast Stone or Ballast Stone Fragment	07/03/87
87	Small Ballast Stone or Ballast Stone Fragment	07/03/87
88	Small Ballast Stone or Ballast Stone Fragment	07/03/87
89	Small Ballast Stone or Ballast Stone Fragment	07/03/87
90	Small Ballast Stone or Ballast Stone Fragment	07/03/87
91	Small Ballast Stone or Ballast Stone Fragment	07/03/87
92	Small Ballast Stone or Ballast Stone Fragment	07/03/87

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Exhibit Number	Artifact Description	Date Recovered
93	Small Ballast Stone or Ballast Stone Fragment	07/03/87
94	Small Ballast Stone or Ballast Stone Fragment	07/03/87
95	Small Ballast Stone or Ballast Stone Fragment	07/03/87
96	Small Ballast Stone or Ballast Stone Fragment	07/03/87
97	Small Ballast Stone or Ballast Stone Fragment	07/03/87
98	Small Ballast Stone or Ballast Stone Fragment	07/03/87
99	Small Ballast Stone or Ballast Stone Fragment	07/03/87
100	Small Ballast Stone or Ballast Stone Fragment	07/03/87
101	Small Ballast Stone or Ballast Stone Fragment	07/03/87
102	Small Ballast Stone or Ballast Stone Fragment	07/03/87
103	Small Ballast Stone or Ballast Stone Fragment	07/03/87
104	Small Ballast Stone or Ballast Stone Fragment	07/03/87
105	Small Ballast Stone or Ballast Stone Fragment	07/03/87
106	Small Ballast Stone or Ballast Stone Fragment	07/03/87
107	Small Ballast Stone or Ballast Stone Fragment	07/03/87
108	Small Ballast Stone or Ballast Stone Fragment	07/03/87
109	Small Ballast Stone or Ballast Stone Fragment	07/03/87

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Exhibit Number	Artifact Description	Date Recovered
110	2-3/4" x 2" Shard of Spanish Red Earthenware	07/21/87
111	3" Rim of Spanish Red Earthenware Jar	07/21/87
112	1 Donut Shaped Neck of Spanish Olive Jar	07/24/87
113	Rim of Spanish Red Earthenware Container--Fragment	07/24/87
114	Rim of Spanish Earthenware Jar--Fragment	07/24/87
115	Small Shard of Spanish Red Earthenware	07/24/87
116	Small Shard of Spanish Red Earthenware	07/24/87
117	Small Shard of Spanish Red Earthenware	07/24/87
118	Small Shard of Spanish Red Earthenware	07/24/87
119	Small Shard of Spanish Red Earthenware	07/24/87
120	Small Shard of Spanish Red Earthenware	07/24/87
121	Small Shard of Spanish Red Earthenware	07/24/87
122	Small Shard of Spanish Red Earthenware	07/24/87
123	Small Shard of Spanish Red Earthenware	07/24/87
124	Small Shard of Spanish Red Earthenware	07/24/87
125	Small Shard of Spanish Red Earthenware	07/24/87
126	Small Stone	07/24/87
127	Small 3" x 2" x 2" Triangular Shard of Spanish Earthenware	07/24/87

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BLAIR, JOHNSON

Exhibit Number	Artifact Description	Date Recovered
128	3-½" x 4" Ribbed Shard Spanish Earthenware	07/24/87
129	2" Rim Fragment of Spanish Red Earthenware Jar	07/24/87
130	2-½" Rim Fragment of Spanish Red Earthenware Jar	07/24/87
131	2-½" Rim Fragment of Spanish Red Earthenware Jar	07/24/87
132	2-3/4" Rim Fragment of Spanish Red Earthenware Jar	07/24/87
133	Plain Shards of Spanish Red Earthenware	07/28/87
134	Plain Shards of Spanish Red Earthenware	07/28/87
135	Plain Shards of Spanish Red Earthenware	07/28/87
136	Plain Shards of Spanish Red Earthenware	07/28/87
137	Plain Shards of Spanish Red Earthenware	07/28/87
138	Plain Shards of Spanish Red Earthenware	07/28/87
139	Plain Shards of Spanish Red Earthenware	07/28/87
140	Plain Shards of Spanish Red Earthenware	07/28/87
141	Plain Shards of Spanish Red Earthenware	07/28/87
142	Plain Shards of Spanish Red Earthenware	07/28/87
143	Plain Shards of Spanish Red Earthenware	07/28/87
144	Plain Shards of Spanish Red Earthenware	07/28/87
145	Plain Shards of Spanish Red Earthenware	07/28/87
146	Plain Shards of Spanish Red Earthenware	07/28/87
147	Plain Shards of Spanish Red Earthenware	07/28/87
148	Plain Shards of Spanish Red Earthenware	07/28/87
149	Plain Shards of Spanish Red Earthenware	07/28/87
150	Plain Shards of Spanish Red Earthenware	07/28/87
151	Plain Shards of Spanish Red Earthenware	07/28/87

Exhibit Number	Artifact Description	Date Recovered
152	Plain Shards of Spanish Red Earthenware	07/28/87
153	Plain Shards of Spanish Red Earthenware	07/28/87
154	Plain Shards of Spanish Red Earthenware	07/28/87
155	Plain Shards of Spanish Red Earthenware	07/28/87
156	Plain Shards of Spanish Red Earthenware	07/28/87
157	Plain Shards of Spanish Red Earthenware	07/28/87
158	Plain Shards of Spanish Red Earthenware	07/28/87
159	Plain Shards of Spanish Red Earthenware	07/28/87
160	Plain Shards of Spanish Red Earthenware	07/28/87
161	Plain Shards of Spanish Red Earthenware	07/28/87
162	Plain Shards of Spanish Red Earthenware	07/28/87
163	Plain Shards of Spanish Red Earthenware	07/28/87
164	Plain Shards of Spanish Red Earthenware	07/28/87
165	Plain Shards of Spanish Red Earthenware	07/28/87
166	Plain Shards of Spanish Red Earthenware	07/28/87
167	Plain Shards of Spanish Red Earthenware	07/28/87
168	Plain Shards of Spanish Red Earthenware	07/28/87
169	Plain Shards of Spanish Red Earthenware	07/28/87
170	Plain Shards of Spanish Red Earthenware	07/28/87
171	2-3/4" x 2-¼" Shard of Spanish Red Earthenware with Partial Base	07/28/87
172	3-¼" x 2" Shard of Spanish Red Earthenware with Partial Rim	07/28/87
173	4-¼" x 3-¼" Shard of Spanish Earthenware	07/28/87
174	Badly Sulphided Silver Coin	07/30/87
175	Fragment of Spanish Olive Jar Neck	07/30/87

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BLAIR, JOHNSON

Exhibit Number	Artifact Description	Date Recovered
176	Glazed Shard of Spanish Brown and Yellow Pottery	07/30/87
177	Small Shard of Spanish Red Earthenware	07/30/87
178	Small Shard of Spanish Red Earthenware	07/30/87
179	Small Shard of Spanish Red Earthenware	07/30/87
180	Small Shard of Spanish Red Earthenware	07/30/87
181	Small Shard of Spanish Red Earthenware	07/30/87
182	Small Shard of Spanish Red Earthenware	07/30/87
183	Small Shard of Spanish Red Earthenware	07/30/87
184	Small Shard of Spanish Red Earthenware	07/30/87
185	Small Shard of Spanish Red Earthenware	07/30/87
186	Small Shard of Spanish Red Earthenware	07/30/87
187	Small Shard of Spanish Red Earthenware	07/30/87
188	Small Shard of Spanish Red Earthenware	07/30/87
189	Small Shard of Spanish Red Earthenware	07/30/87
190	Small Shard of Spanish Red Earthenware	07/30/87
191	Small Shard of Spanish Red Earthenware	07/30/87
192	Small Shard of Spanish Red Earthenware	07/30/87
193	Small Shard of Spanish Red Earthenware	07/30/87
194	Small Shard of Spanish Red Earthenware	07/30/87
195	Small Shard of Spanish Red Earthenware	07/30/87
196	Small Shard of Spanish Red Earthenware	07/30/87
197	Small Shard of Spanish Red Earthenware	07/30/87
198	Small Shard of Spanish Red Earthenware	07/30/87
199	Small Shard of Spanish Red Earthenware	07/30/87
200	2" x 2" Shard of Plain Spanish Earthenware	07/30/87

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Exhibit Number	Artifact Description	Date Recovered
201	4" x 2½" Shard of Plain Spanish Earthenware	07/30/87
202	Small Rim Fragment of Spanish Red Earthenware Jar	07/30/87
203	Small Rim Fragment of Spanish Red Earthenware Jar	07/30/87
204	Small Rim Fragment of Spanish Red Earthenware Jar	07/30/87
205	Small Rim Fragment of Spanish Red Earthenware Jar	07/30/87
206	Small Ballast Stone	02/14-15/88
207	Small Ballast Stone	02/14-15/88
208	Small Ballast Stone	02/14-15/88
209	Small Ballast Stone	02/14-15/88
210	Small Ballast Stone	02/14-15/88
211	Small Ballast Stone	02/14-15/88
212	Small Ballast Stone	02/14-15/88
213	Small Ballast Stone	02/14-15/88
214	Small Ballast Stone	02/14-15/88
215	Small Ballast Stone	02/14-15/88
216	Small Ballast Stone	02/14-15/88
217	Small Ballast Stone	02/14-15/88
218	Small Ballast Stone	02/14-15/88
219	Small Ballast Stone	02/14-15/88
220	Small Ballast Stone	02/14-15/88
221	Small Ballast Stone	02/14-15/88
222	Small Ballast Stone	02/14-15/88

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Exhibit Number	Artifact Description	Date Recovered
223	Small Ballast Stone	02/14-15/88
224	Small Shard of Spanish Red Earthenware	02/14-15/88
225	Small Shard of Spanish Red Earthenware	02/14-15/88
226	Small Shard of Spanish Red Earthenware	02/14-15/88
227	Small Shard of Spanish Red Earthenware	02/14-15/88
228	Small Shard of Spanish Red Earthenware	02/14-15/88
229	Small Shard of Spanish Red Earthenware	02/14-15/88
230	Small Shard of Spanish Red Earthenware	02/14-15/88
231	Small Shard of Spanish Red Earthenware	02/14-15/88
232	Small Shard of Spanish Red Earthenware	02/14-15/88
233	Small Shard of Spanish Red Earthenware	02/14-15/88
234	Small Shard of Spanish Red Earthenware	02/14-15/88
235	Small Shard of Spanish Red Earthenware	02/14-15/88
236	Small Shard of Spanish Red Earthenware	02/14-15/88
237	Small Shard of Spanish Red Earthenware	02/14-15/88
238	Small Shard of Spanish Red Earthenware	02/14-15/88
239	Small Shard of Spanish Red Earthenware	02/14-15/88
240	Small Shard of Spanish Red Earthenware	02/14-15/88

Exhibit Number	Artifact Description	Date Recovered
241	Small Shard of Spanish Red Earthenware	02/14-15/88
242	Small Shard of Spanish Red Earthenware	02/14-15/88
243	Small Shard of Spanish Red Earthenware	02/14-15/88
244	Small Shard of Spanish Red Earthenware	02/14-15/88
245	Small Shard of Spanish Red Earthenware	02/14-15/88
246	Small Shard of Spanish Red Earthenware	02/14-15/88
247	Small Shard of Spanish Red Earthenware	02/14-15/88
248	Small Shard of Spanish Red Earthenware	02/14-15/88
249	Small Shard of Spanish Red Earthenware	02/14-15/88
250	Small Shard of Spanish Red Earthenware	02/14-15/88
251	Small Shard of Spanish Red Earthenware	02/14-15/88
252	Small Shard of Spanish Red Earthenware	02/14-15/88
253	Small Shard of Spanish Red Earthenware	02/14-15/88
254	Small Shard of Spanish Red Earthenware	02/14-15/88
255	Small Shard of Spanish Red Earthenware	02/14-15/88
256	Small Shard of Spanish Red Earthenware	02/14-15/88
257	Small Shard of Spanish Red Earthenware	02/14-15/88

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Exhibit Number	Artifact Description	Date Recovered
258	Small Shard of Spanish Red Earthenware	02/14-15/88
259	Small Shard of Spanish Red Earthenware	02/14-15/88
260	Small Shard of Spanish Red Earthenware	02/14-15/88
261	Small Shard of Spanish Red Earthenware	02/14-15/88
262	Small Shard of Spanish Red Earthenware	02/14-15/88
263	Small Shard of Spanish Red Earthenware	02/14-15/88
264	Small Shard of Spanish Red Earthenware	02/14-15/88
265	Small Shard of Spanish Red Earthenware	02/14-15/88
266	Small Shard of Spanish Red Earthenware	02/14-15/88
267	Small Shard of Spanish Red Earthenware	02/14-15/88
268	Small Shard of Spanish Red Earthenware	02/14-15/88
269	1" x 2" Shard of Plain Spanish Earthenware	02/14-15/88
270	1-½" x 1" Shard of Spanish Red Earthenware Rim	02/14-15/88
271	3-½" x 4" Rim of Spanish Red Earthenware Jar	02/14-15/88
272	Blank	
273	3-½" x 2" Unidentified Metal Object	02/14-15/88
274	3-½" x 2-½" Cluster of Badly Deteriorated Metal Objects	02/14-15/88
275	4" x 2" Metal Cluster with what is Believed to be Fragment of Bosun's Whistle Attached	02/14-15/88

Exhibit Number	Artifact Description	Date Recovered
276	Part 2 of No. 275; 3" Hollow Metal Object	02/14-15/88
277	6" x 2" Portion of what Appears to be Metallic Pulley Head (Questionable Vintage)	02/14-15/88
278	4-½" x 3" Shard of Blown Glass Bottle (Uncertain Vintage)	02/14-15/88

Dated: MARCH 18, 1988.

KLEMM, BLAIR, STERLING & JOHNSON
A Professional Corporation

By: Elizabeth Melancon
ELIZABETH MELANCON

M41/48415-01
WD221(AA)

IN THE DISTRICT COURT OF GUAM

TERRITORY OF GUAM

ROBERT MARX, Plaintiff, vs. TWO WRECKED AND ABANDONED VESSELS, ETC., vs. DAVEY JONES ARCHAEOLOGY, Claimant.	CIVIL CASE NO. 87-00036
DAVEY JONES ARCHAEOLOGY, LTD. Plaintiff, vs. THE UNIDENTIFIED WRECKED AND ABANDONED VESSEL, ETC. Defendant.	CIVIL CASE NO. 87-00038 INVENTORY OF ARTIFACTS RECOVERED FROM PILAR WRECKSITE AND RELATED MATERIALS

A. DAVEY JONES ARCHAEOLOGY, LTD. ARTIFACT INVENTORY

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///

MOORE, CHING, HOLNTZEL & LAWLON
AGANA, GUAM 96910

	ARTIFACT DESCRIPTION	Date Recovered
1.	Shard of red Spanish Earthenware 3-3/4" x 3-1/2" approx. (site #39)	12/11/87
2.	Shard of red Spanish Earthenware 2-3/4" x 3" approx. (site #37)	12/11/87
3.	Shard of red Spanish Earthenware 3-1/2" x 3-3/4" approx. (site #37)	12/11/87
4.	Shard of red Spanish Earthenware 2-5/8" x 3-7/8" approx. (site #39)	12/11/87
5.	Squared copper alloy spike (bent) 5-3/8" long (site #37)	12/11/87
6.	Six-sided sounding lead 23" long, 3" at bottom, 2" at top (site #52)	12/27/87
7.	Shard of oriental procelain (possibly of Ming origin) 1" x 9/16" approx.	06/86
8.	Shard of oriental procelain (possibly of Ming origin) 1" x 7/8" approx.	06/86
9.	Shard of oriental procelain (possibly of Ming origin) 7/8" x 5/8" approx.	06/86
10.	Shard of oriental procelain, probable rim fragment (possibly of Ming origin) 9/16" x 5/8" approx.	06/86
11.	Shard of oriental procelain, probable rim fragment (possibly of Ming origin) 5/8" x 1-1/2" approx.	06/86
12.	Shard of oriental procelain, probable rim fragment (possibly of Ming origin) 5/8" x 15/16" approx.	06/86

B. Photographs of Artifacts Nos. 1 through 6 listed above.

C. Diagram of Artifact No. 6.

D. Sketches and measurements of Oriental Procelain Shards-Artifact Nos. 7 through 12 listed above.

E. Sketch of discovery sites Nos. 37 & 39 (Spanish Pottery Shards and Bronze Spike).

F. Depth Profile of Sounding Lead Discovery Site No. 52-Artifact No. 6.

G. Profile of Depth Gradations for Metal Detector Search Site, January 2, 1988; and location of Anomalies discovered in area-site No. 46 (presently unexcavated).

H. Map Locations of N.S. Pilar.

DATED: 3/24/88

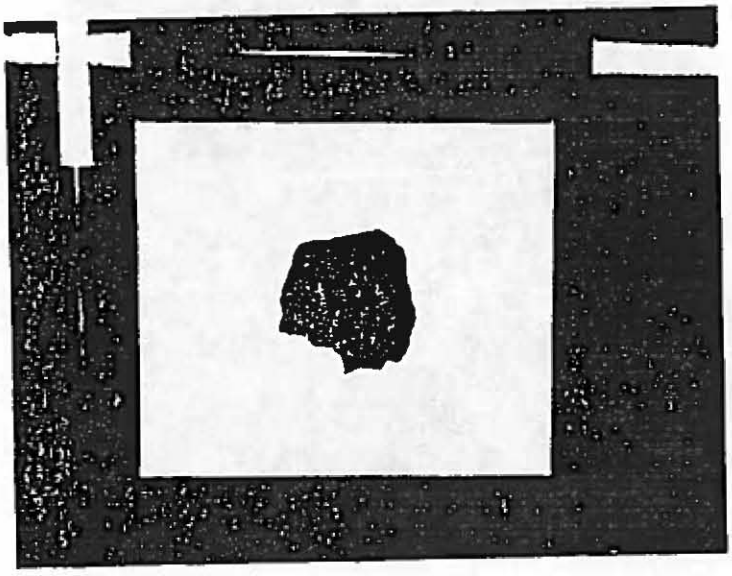
MOORE, CHING, BOERTZEL & LAWLOR
A Professional Corporation
Counsel for Davey Jones
Archaeology, Ltd.

By Paul A. Lawlor
A Licensed Employee.

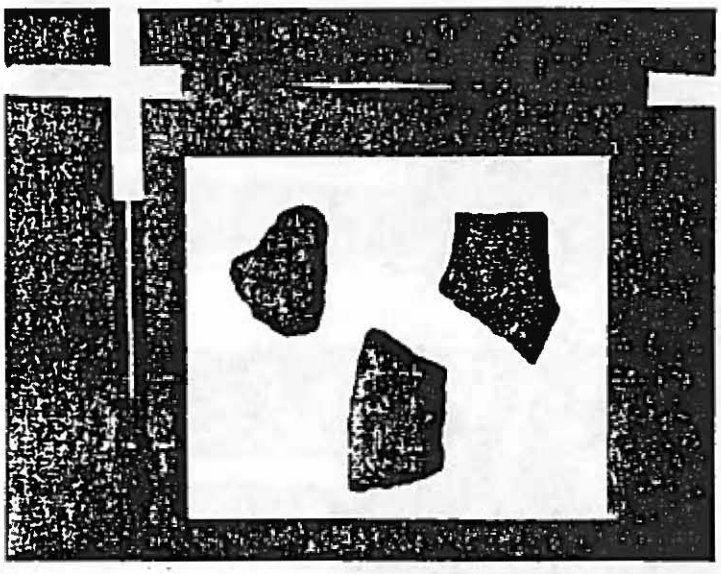
MOORE, CHING, BOERTZEL & LAWLOR
A PROFESSIONAL CORPORATION
SUITE 200 GCIC BUILDING
414 WEST SOLEDAD AVENUE
AGANA, GUAM 96910
TELEPHONE (671) 477-8706/472-8868

PAL:nr
D#P4.49 F#3913

Lots of Artifacts 1-6



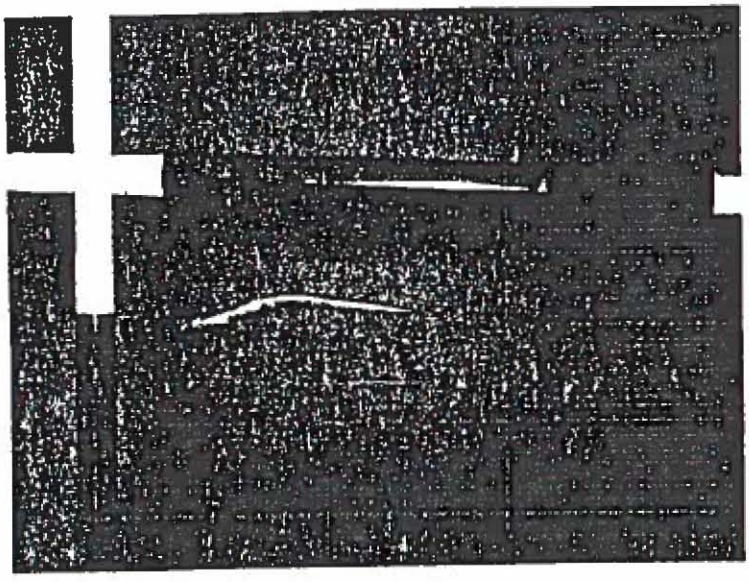
#1



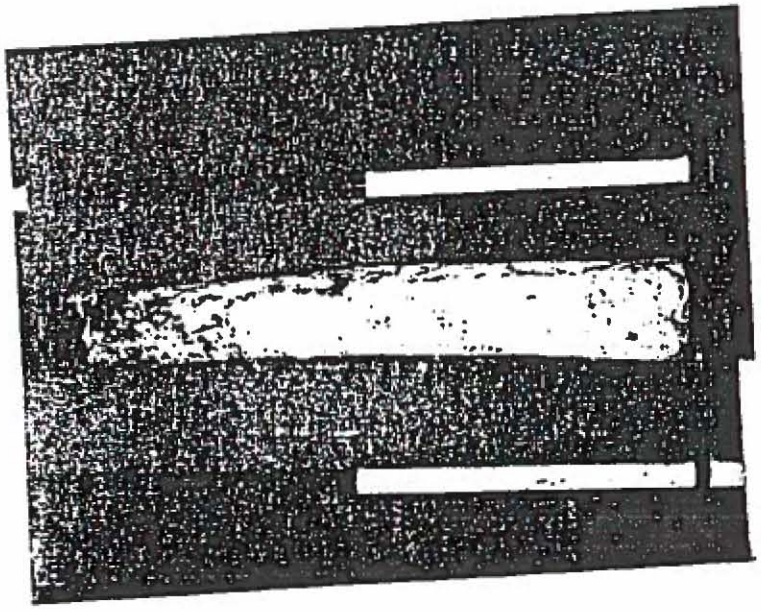
#s 2,3+4

B.

Photos of ARtifacts - Cont.



#5

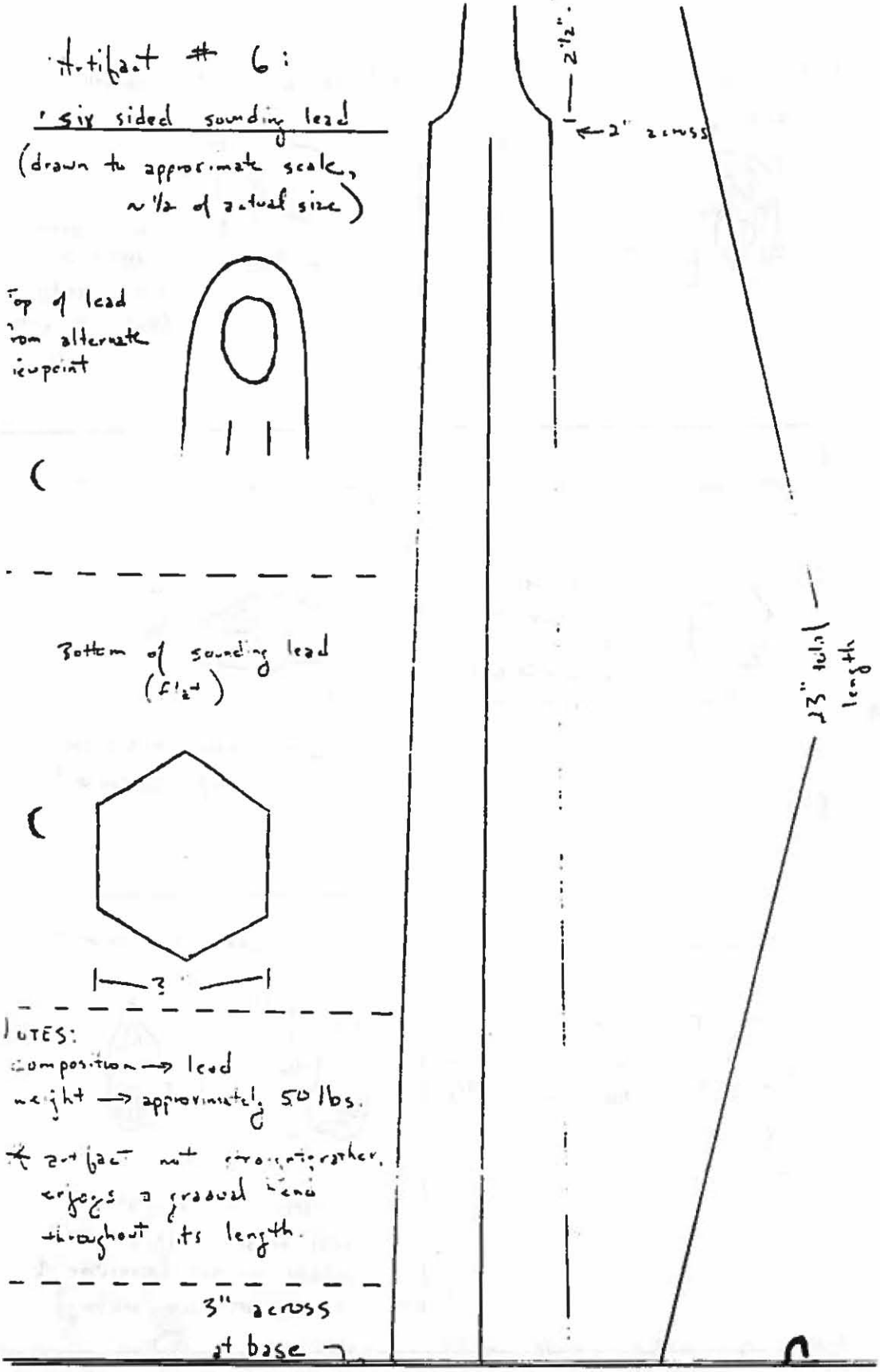


#6

Artifact # 6:

six sided sounding lead

(drawn to approximate scale, ~1/2 of actual size)

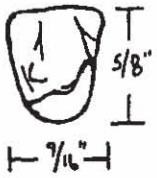


NOTES:
composition → lead
weight → approximately 50 lbs.
artifact not straight together, edges a gradual bend throughout its length.

7) "FLAT" SHARD

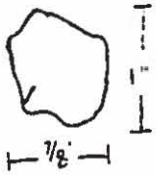
SKETCH FEATURES PAINTED SIDE OF SHARD - BLUE ON WHITE FIELD

10) SHARD, PROBABLE RIM FRAGMENT



SKETCH AGAIN FEATURES PAINTED SIDE OF SHARD (BLUE ON WHITE FIELD)

8) "FLAT" SHARD



SKETCH SHOWS BASICALLY WHITE FIELD WITH ONLY A TOUCH OF BLUE - (LOWER LEFT)

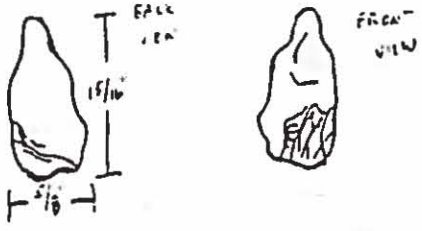
11) SHARD, PROBABLE RIM FRAGMENT

SKETCH AGAIN FEATURES PAINTED SIDE OF SHARD. (BLUE ON WHITE FIELD)

9) "FLAT" SHARD

SKETCH AGAIN FEATURES PAINTED SIDE OF SHARD - BLUE ON WHITE FIELD

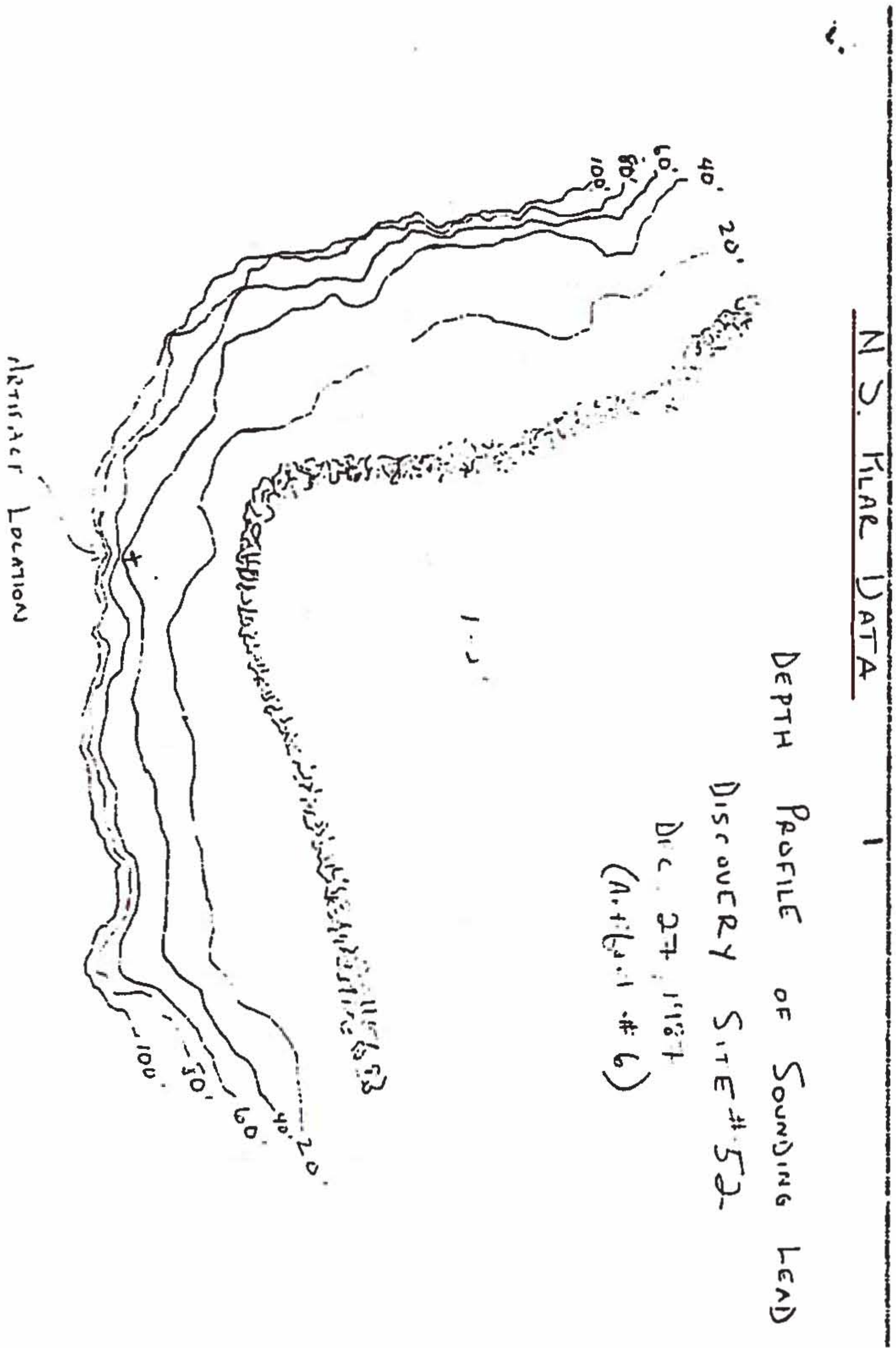
12) SHARD, PROBABLE RIM FRAGMENT



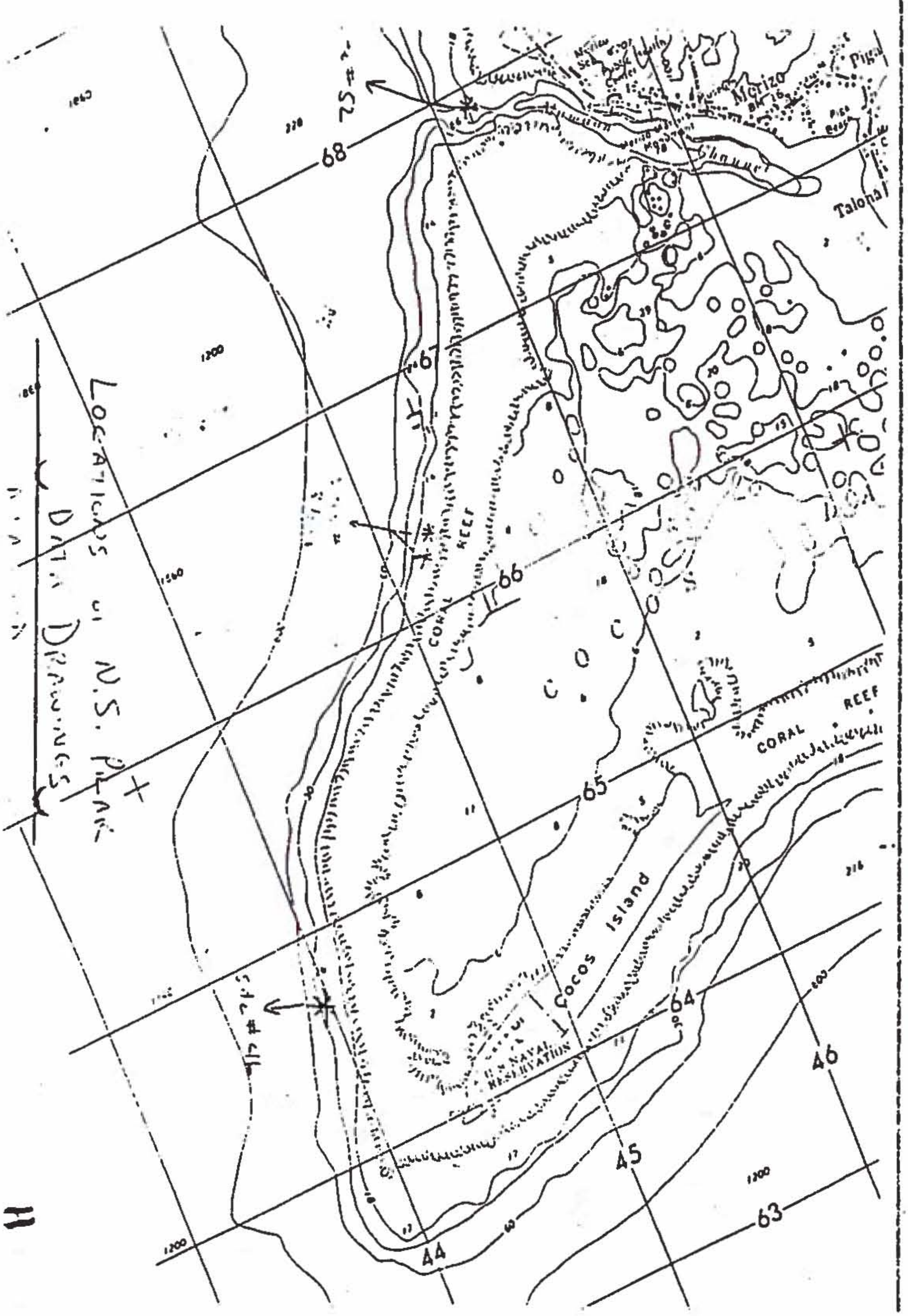
SKETCHES FEATURE FRONT & BACK SIDES OF SAME SHARD, BLUE PAINT EVIDENT ON EACH. (Assignation of "Front" & "BACK" merely arbitrary)

NOTE: [illegible]

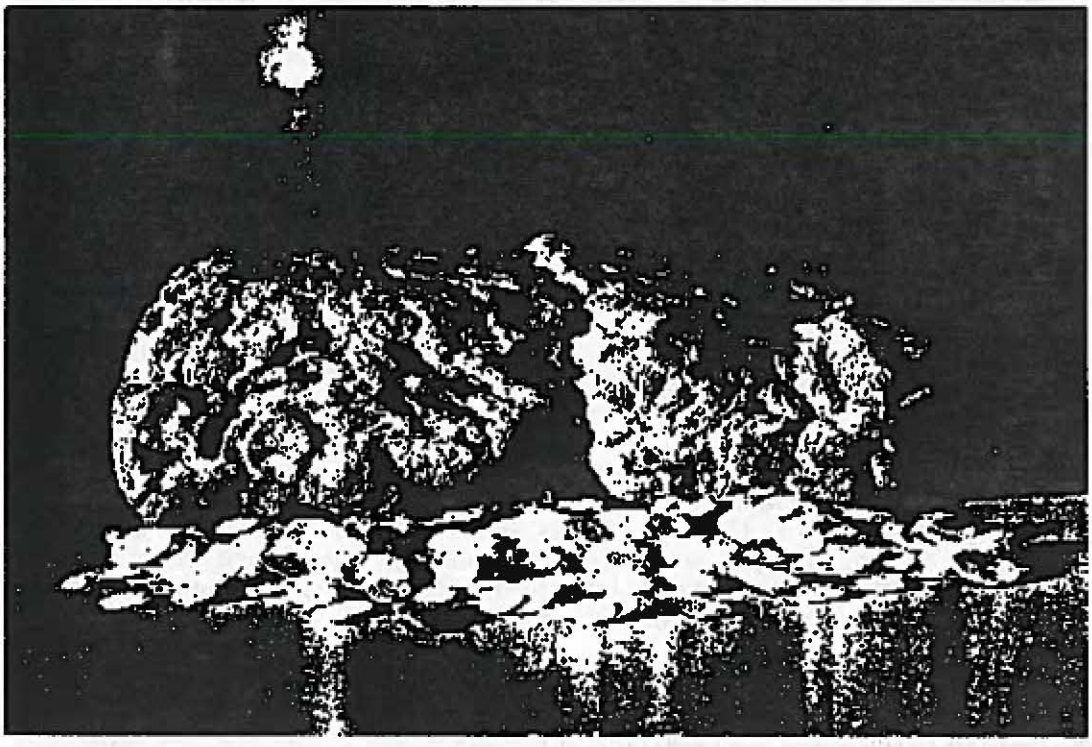
SAND


N.S. PILAR DATA
DEPTH PROFILE OF SOUNDING LEAD
DISCOVERY SITE #52
ARTIFACT LOCATION

SAND
SAND
SAND
REEF
PINNACLE
~ 40'
REEF
PINNACLE
~ 40'
55'
45'
50'
60'
55'
65'
55'
45'
70'
20'


Merizo
Talona
CORAL REEF
CORAL REEF
Cocos Island
U.S. NAVAL RESERVATION
68
67
66
65
64
63
44
45
46

COIN CHARACTERISTICS.



A CONCRETED CHEST OF SILVER COINS, recovered from the wreck of Nuestra Senora de Atocha during 1985, in two pieces, following the rectangular outline of a chest, together with approximately 110 loose coins or clumps - overall length 18in. (46cm.) Weight: 164 lb.

Most of the 180,000 coins from the Atocha have been recovered from chests like this, found stowed in the cargo hold of the ship. The six-board wooden chests that contained the coins have in many cases completely disintegrated, leaving a concreted mass in the same shape as the chest. The coins appear to have been placed in the chests randomly, and, from the examples that have undergone conservation, some specimens from the Mexico mint dated as early as 1607 up to 1616, and from the Lima mint from 1572 to 1578,have been recovered from every chest. One chest on conservation was found to contain 2,516 coins, all eight-reales, while another example yielded 7,139 specimens, all two-reales. So far, the most common coins recovered from chests have been eight-reales from the Potosi mint, bearing assay masters' marks T or Q and bearing dates from 1617 to 1622.

The concreted mass is bound in a matrix of silver chlorides, sulfides and calcareous deposits that yields to electrolytic reduction For a description of the processes used by Treasure Salvors in the recovery of silver coins from concreted chests, see N. Neil Harris, "Coins of the Nuestra Senora de Atocha" in The Numismatist, October, 1986, pp. 2017-2040.

"DIE GRATIA REX HISPANIARUM ET INDIARUM".

These words were struck on the legend of every coin minted in the New World. "By the grace of God, King of the Spains and the Indies", is often only visible in part, due to the clipping of the coins to the proper weight after they were struck. If the coin was minted after 1617. the date, on the legend and the ruling monarch's name would appear. If the date is not visible, then some of the remaining marks on the coin will

help you identify when the coin was made. The letters "CAR" or "LVS" indicate that the monarch is one of the Charles'. Likewise, "PH" or "PVS" will be one of the Philip's.

The shields of the coins of this time illustrate the political influence of each monarch. The changes in power from one monarch to the next are represented by subtle changes in the shields. Alliances have changed through the years due to wars and marriages and are represented by the different characters and their relative size.

In general, Phillip II coins, notably those minted in Lima, but including the early Potosi coins. are distinguished by being round, flat and are finely engraved. The legend "PHILLIPVS D.G," with commas seperating the words and letters and no numerals following the name of the monarch, is usually proof that they were minted during the reign of Phillip II. In addition, Mexican coins of this period show only two bendlets in the arms of the Low Countries whereas those of Phillip III and Phillip IIII show three bendlets. Frequently, Phillip II coins will show the traditional shield instead of the two fluers-de-lis pattern seen in Phillip III coins.

The pomegranate that represents Granada is moved closer to the part of the shield that represents Flanders and Tyrol in the shield of Phillip IV. The shield of Charles II, the last of the Hapsburg Kings, is very similar to Phillip IV except for Burgundy's design. Phillip V was from a new lineage, the French Bourbons. He changed the center of the traditional shield by adding three fluers-de-lis and put Flanders and Tyrol into the bottom of the shield.

The obverse of the coins of this period have either a shield, or later, have a pillar and wave design. All Mexican gold cobs have a shield design on them. The date might be apparent in the upper left hand edge of the shield side of the coin. The coins that were minted in the 1620's use a "Z" instead of a "2". No dates were struck on Mexican coins before 1607, all silver cobs were of the shield design as well. The gold Santa Fe De Bogota coins were very crude and often only show the design for Naples and Sicily with the castles and lions as the whole shield.

Potosi and Lima coins adopted the pillar and waves design in 1684 and 1652 respectively. The design is very similar and if the mint mark is not visible in the upper left and lower right hand corner you can distinguish between the two mints by the waves underneath the pillars. When the waves go down between the middle spaces the mint is Lima.

The verticle lines of this design stand for the pillars of Hercules that stood on either side of the Straights of Gibralter at the entrance of the Mediterranean Sea. The waves represent the area beyond the pillars or the Atlantic where the New World was found by Spain. In the center of the design are the letters. PLV-SVL-TRA or just PVA which stands for plus ultra or "more beyond". The whole message giving the impression that Spain had influence and or control over most of the world, old or new.

ROYAL COIN MARKINGS

MONARCH	REIGN	INSCRIPTION	COMMENT
Carlos I or Charles I	1519-1556	CARLOS ET JOHANA	Ruled with Mother. Also knownas Charles V, the Holy Roman Emperor.
Philip II	1556-1598	PHILIPPVS, FELIPE	Use"V" instead of "U" in name.
Philip III	1598-1621	PHILIPPVS III	First use of ordinal number.

MONARCH	REIGN	INSCRIPTION	COMMENT
Philip IIII	1621-1665	PHILIPPVS IIII	Use of IIII not IV.
Carlos II	1665-1700	CAROLVS II	Last Hapsburg King.

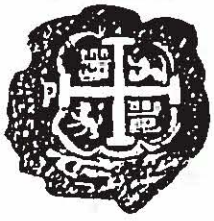
MINTING PROCEDURES IN THE "NEW WORLD".

The above illustration shows the assayer and his indian slave assistants engaged in producing coins of the mint. The indian in the center is taking freshly poured strips of silver and beating the strips flat. He then hands the beaten strips to the worker at the left, who cuts the strips into coin planchets. The indian at the right takes these coin planchets and puts them one at a time on top of the bottom coin die. He then takes another die and places it on top of the coin planchet and strikes the dies with a hammer which impresses the die design on both sides of the coin planchet. The newly struck coins are passed to the assayer who weighs them and clips off any excess silver. The coins are now ready for distribution to pay for trade goods, wages and the ever increasing national debt of Spain. Due to the method used to make the coins, no two coins look alike. The coins of this period are often called cob coins. This term comes from a simplification of the Spanish phrase, "cabo de barra", or made from an end of a bar. The coins, like the silver ingots that were being mined, are made from a very fine quality of silver. The purity ranges from about 92% to 98% silver with the impurities being copper or platinum depending on which mine the silver came from.

The crude hand struck process was replaced in 1733 with the "screw press" method which eliminated the irregularly stamped pattern inherent to hand held dies. The screw press was a technological jump. The dies were no longer held by hand. The coin was set between two dies and the top die was screwed down to the bottom die using the power of two massive weights opposing each other above the press. This process formed near perfect coins.

COIN TYPES PRODUCED BY DIFFERENT METHODS.

Early Coin
Lima Circa 1576



"Cob" Coin
Potosi Circa 1670

"Royal" Coin
Lima 1686

Screw Press Coin
Mexico 1733

The early coins were well rounded and engraved. They were produced at the Mexico, Lima and Potesi mints. When the mints were first opened the mintmaster took great pride in producing attractive and distinctive coins. This special attention to detail was costly as it slowed down the amount of coins that could be produced. CIRCA 1576

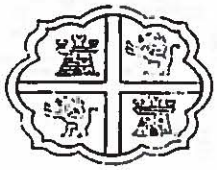
The "Cob" coins were made from the odd shaped coin blanks or flans that were mass produced with little care to make them round. The purity of the silver was carefully maintained at 93.6% pure and the weight of each coin was achieved by clipping off the corners until the weight was within specifications. The coin blanks were struck betweenthe dies by indian slaves. Much of the design, legend and date were missing from these "macquinas" coins. CIRCA 1670

The Royal Coins were made on special occcisions to reward people for outstanding services. Great care to get the entire design on the coins and make them a work of art. Even the coin dies were especiallymade. Many of these coins are now found with a hole in them, indicating they were worn on a necklace as a medalion. CIRCA 1686

The screw press Coins were not hand struck, but machine pressed to make a near perfect coin. These coins portrayed the Spanish Monarchs with their coats of arms and or the "Pillars of Hercules" CIRCA 1733

IDENTIFYING SPANISH COINS BY THEIR CROSS DESIGNS.

The cross on the Spanish coin symbolizes the union of church and state and the premise that Spain was the most powerful Catholic country in the world. The basis for all the crosses that appear on the reverse side of the coins is the Jerusalem cross or Crusader's cross.



Greek Cross
1571-1652

Jerusalem Cross
1652-1772

Florenzada Cross
1572-1713

The "Cruz Griega" or Greek Cross was used by the New World mints of Potosi, LaPlata, Lima, Bogota and Cartagena. Lima was the first mint to begin this design in 1571 and the other mints followed until 1652 when the coin die was changed to the "Pillar & Waves" design.

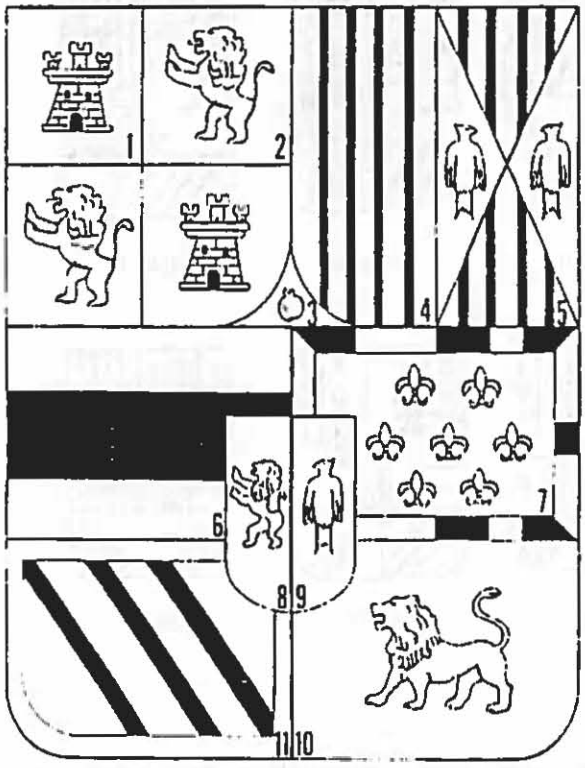
The Jerusalem cross with the perpendicular arms was used by the Potosi mint

from 1652 to 1772 and the Lima mint from 1684 to 1751. These coins are very similar but can be distinguished by their mint marks of"L" and "P" respectively.

The Cruz Florenzada was used only by the Mexico mint on their silver coins. The cross appears to have raised circular dots attached to the ends of the cross which were meant to look like fluers-de-lis. Mexican gold coins do not always have the dots on the end and often have just the Jerusalem cross with the perpendicular arm.

The cross side also has the Lions of Leon and the Castles of Castile in the four quadrants of the cross. This symbolizes the joining of the two provences that eventually united Spain and promoted her to the most influential country in the world and remained that way for almost four centuries.

THE "GREAT" SHIELD OF HAPSBERG.



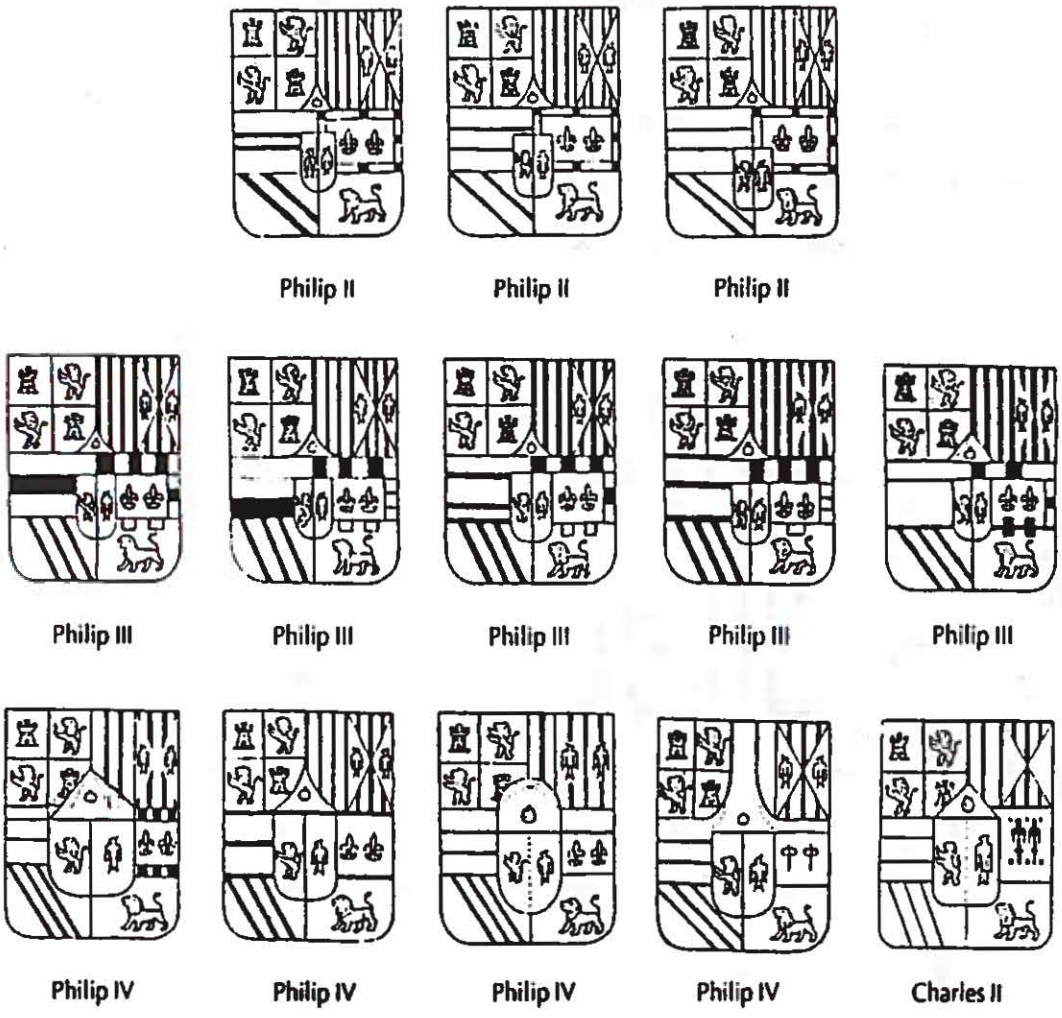
KEY TO COUNTRIES REPRESENTED

1.... Castile
2.... Leon
3.... Granada
4.... Aragon
5.... Naples and Sicily
6.... Austria
7.... Burgundy
8.... Flanders
9.... Tyrol
10.... Brabant
11.... The Low Countries

The "Great" shield of the House of Hapsburg was the basis for the obverse of the coin. These shield-and-cross type coins were struck in the Spanish Colonies during the reigns of Philip II, Philip III, Phillip IV and Charles II.

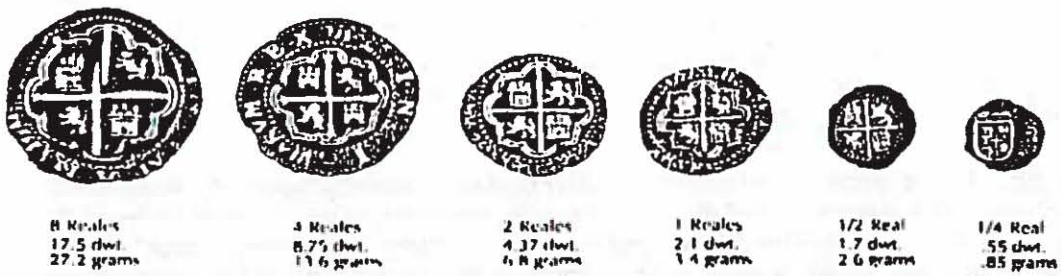
After the conquest of Portugal (1580) The coat-of-arms of the country was added. It was customary to show this addition on coins struck only in the Old World. The early die-sinkers of Potosi in the Vice-royalty of Peru, copied this shield much more faithfully than did those of New Spain (Mexico) and almost all others simplified. Variations of the shield for different monarchs are shown on page E-6.

COMPARITIVE DIAGRAM OF THE DIFFERENT SPANISH COATS OF ARMS



COIN DENOMINATIONS.

Examples of each of the different denominations of Spanish colonial coins are shown in the diagrams below :



MINT MARKS.

MEXICO CITY
O O
M X
M

The Mexico mint was established in 1535 and minted its first coin in 1536. It continued to produce coins in prodigious amounts up to 1821 when Spain lost Mexico. Gold coins started to be minted in 1679. Mexican coins have a ball on the ends of the cross unlike any other mint.

POTOSI
P

Potosi is located in the Andes Mountains in Bolivia, formerly theViceroyalty of Peru. The mine of Potosi was the richest silver mine in the world which produced much of the world's coins and ingots. Potosi mint never made gold coins and ceased striking coins in1773. Potosi mint started in 1575 after the closing of the LaPlata and Lima mints.

LIMA
P
L

The mint was open from 1568 to 1588. Pre 1570 design was the pillar and waves until the shield design was adopted. The Lima mint was re-opened permanently in 1684 at which time it adopted the pillar and wave design again. The mint closed in 1751.

SANTA FE DE BOGOTA
R N S F
N R F S

The Columbian mint opened in 1620 and started production in 1621. Bogota was the first mint in the New World to be allowed to make gold coins ; the first two years production of gold and silver coins were lost when the Atocha sank in 1622. Specimens from this mint are extremely rare.

LA PLATA
P

Plata means "Land of Silver" and was so named because the La Plata mint was only 110 miles away from the Potosi silver mines. The coins from La Plata are considered very rare for coins were only struck there in 1574. After the mint closed all the equipment and personnel were moved to Potosi to open the new mint there in the following year.

A table of Assayer's marks in use by the American mints is shown on page E-8.

Examples of both sides of a Lima minted coin and a Potesi minted coin are also shown on pages E-9 and E-10 respectively .

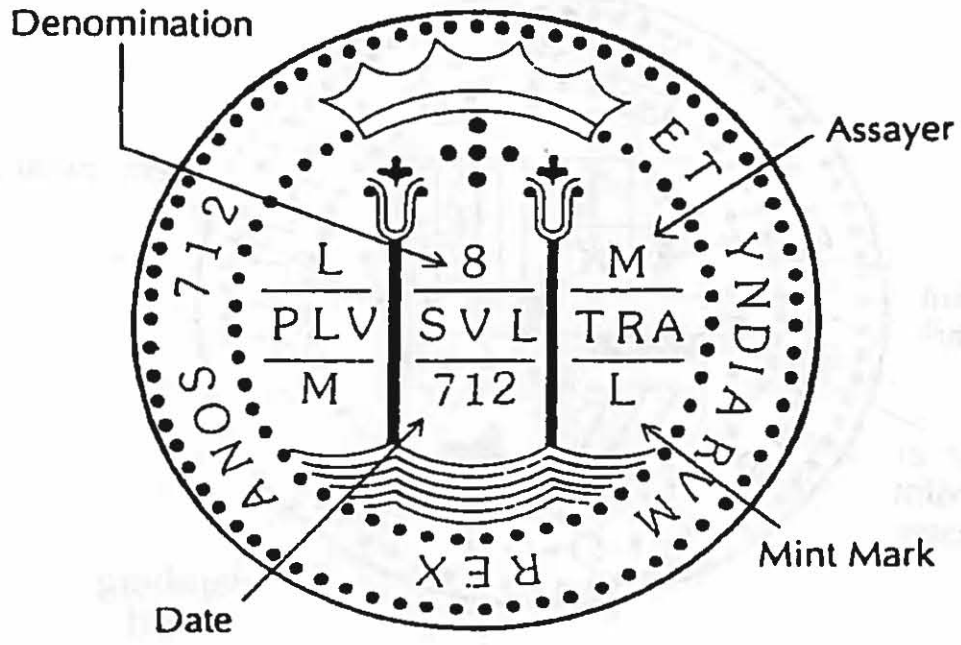
ASSAYER'S MARKS

DATE	ASSAYER'S MARK	CHARACTERISTICS	RULER
LIMA MINT -	MINT MARK "P"		
1568-1588	"R" Alonsa de Rincon	Pillar and Wave design	Philip II
1572-1573 •	"X" Xines Martinez	Shield design	
	"M" Xines Martinez		
1574	"B" Alonso Lopez de Barriales		
1575 •	"L" Alonso Lopez de Barriales		
1577	"D" Diego de la Torre	Star is added to die	
1588	MINT CLOSED		
LIMA MINT-	MINT MARK "L"		Philip IV
1659-1660 •	"V" Mint open briefly	Pillar and Waves design	
1684-1693	"V"		Carlos II
1685-1699	"R"		
POTOSI MINT-	MINT MARK "P"	Shield design	Philip II
1574 •	"B" Sometimes erased or struck over "C" from La Plata		
1586-1591	"A" Juan Alvarez Reinaltes		
1591-1598	"R" Gasper Ruiz		
1592-1598	"B" Juan de Ballesteros Navae'z		
1599-1616	"R" Gasper Ruiz		Philip III
1599-1616	"B" Juan de Ballesteros Navae'z		
1617	"M" First dated coin 1617 and 1618		
1617-1618	"Q" Possibly Quasada		
1618 •	"RL" Balasar Ramos Leceta also "RAL"		
1619-1621	"T" Many reversals and broken dies - Possible Torres		
1617-1622	"R"		
1621-1651	"T" Juan Ximenez de Tapia		
1621-1651	"P" P mintmark and P assayer		Philip I
1621-1651	"TR" Pedro Trevino		
1621-1651	"V" Geronimo Velazquez		
1621-1651	"Z"		
1621-1651	"O" Antonio Ovando	"O" Has dot in center	
1652	"E"	Last sheild design	Carlos II
1652-1678	"OE" "E"	Pillar and wave design	
1678-1679	"C"		
1679-1684	"V" Pedro de Villar		
1684-1697	"VR" Monogram for Pedro de Villar		
COLOMBIA MINTS-MINT MARK NR		Shield design	Philip IV
1620-1637	"T" Turrillo		
1620-1637	"A" Alonso de Anuncibay		
1620-1637	"E" Echeverria, Turrillo's assistant		
1620-1637	"H"		
1620-1637	"V" or "VA"		
1627-1632	"P" Miguel Pinto Camargo		
1642-1676	"P" Pedro Ramos also; Porns, Porms, Poras R, RM, RMS, Porams, Porros, Porm, P(), Pors		Carlos II
1676-1690	"OLM's" Jose de Olmos		
1680-1690	"R" Gasper de los Reys		
1690-1710	"ARC"Buenaventura de Acre		Philip V

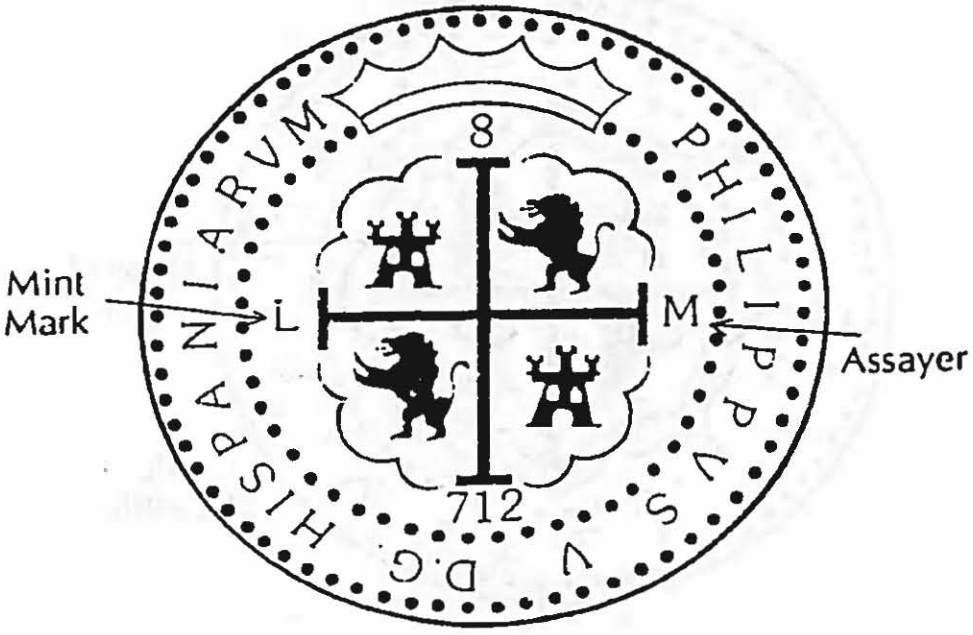
LIMA MINT

Circa 1700

OBVERSE SIDE



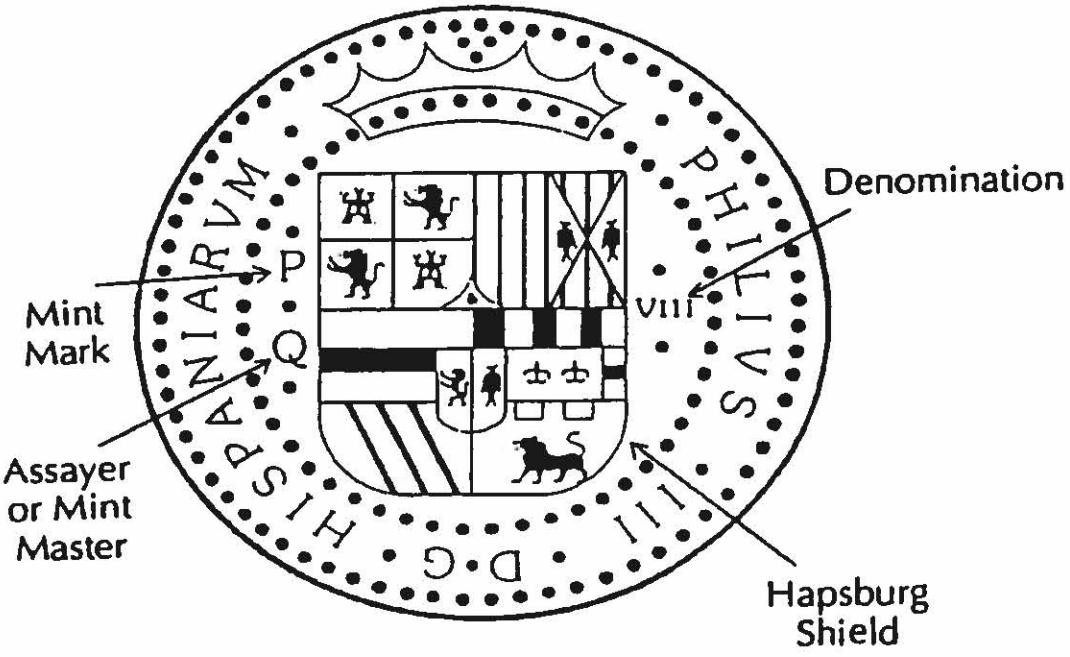
REVERSE SIDE



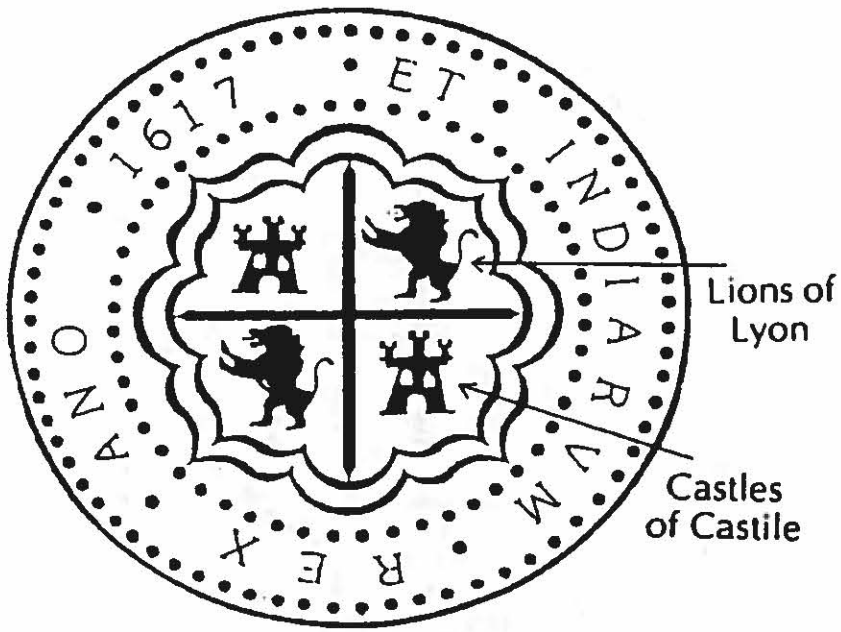
POTOSI MINT

Circa 1600

OBVERSE SIDE



REVERSE SIDE



MEXICAN "ROYAL" EIGHT ESCUDO COINS.

The above examples show specimens of these coins from Mexico City Mint, dated 1702 and marked with Assayer "L". The State Of Florida owns 7 of these very rare presentation pieces. All are dated between 1702 and 1714. Numismatic research since 1900 by world authorities has failed to uncover any archival documentation that deals with these unique gold coins which probably date back to sometime around 1679 when the first gold coins were struck at the Mexico City mint.

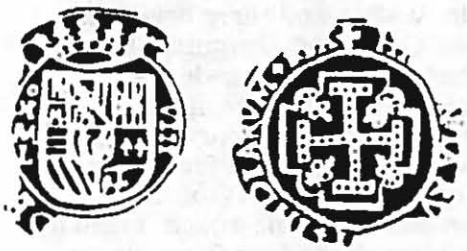
Spanish authorization to strike gold coinage in the New World was officially granted to the Mexico City mint in 1675 (*Pradeau*, 1938). The first actual minting of gold coins did not occur until 1679 when about 14.5 kilograms of 22 karat gold was used to strike cob doubloons. (*Craig*, 1988 citing *Medina*, 1919 and *Elhuyar*, 1818). From Pradeau (1938) figures it is believed that during the next three years, a total of 113,832 Escudos were struck, but it is unknown what denominations these coins represented. Minting statistics for the subsequent years for the first series ranging from 1679 to 1682 has not been documented. Although it is known that coin production continued into the early 18th century, no gold coins from the Mexico City mint predating 1695 have been recovered on the 1715 Spanish treasure shipwrecks off the Florida coast. Mexican cob doubloons in all denominations dominated the gold treasure being sent to Spain on board the 1715 Plate fleet. Over 6,000 of these coins have been salvaged from the wreck sites of this fleet including a number of the unique "Royals" dating back to 1695.

MEXICAN COB DOUBLOON CLASSIFICATION BY DIE VARIETIES 1679-1690.

Type "A"

Reign: CARLOS II
Dates: 1679-1700
Mintmark: "MXO"
Assayer: "L"

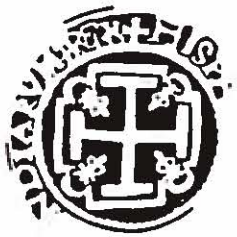
Description: Base of the obverse crown is concave; the pomegranate of Granada in a triangular shield over the arms of Flanders and Tyrol which are located in the center. The field of Aragon bears only one palet; the field of Austria has two. Examples in all denominations.



Type "B"

Type "B"

Reign: CARLOS II
Dates: 1679-1700
Mintmark: "MXO"
Assayer: "L"



Description: Essentially the same as type "A" but the reverse cross potent does not have punctate cross bars; the obverse legend carries a small double-barred cross before "CAROLVS". The word "Gratia" is abbreviated "G". No two Escudos examples have been located.

Type "C"

Reign: CARLOS II
Dates: Possibly only 1689-1700
Mintmark: "MXO"
Assayer: "L."

Description: Changes occur in the shield; the Low Countries have three straight bendlets, the Austrian shield has two bars; Granada appears over the shield of Flanders and Tyrol in the center of the Spanish coat-of-arms. The Burgundy field has two fleurs-de-lis. There is a border at the chief of Burgundy and the fleurs-de-lis are not elongated.

Type "D"

Reign: CARLOS II
Dates: Possibly 1689-1700
Mintmark: unknown
Assayer: unknown

Description: Significantly different from preceding types. There are three bars in Austria and three bendlets in the Low Countries. Burgundy has only one elongated fleur-de-lis. Granada's pomegranate appears in a triangular shield with curved sides. The base of the triangle forms the chief of Flanders and Tyrol. The reverse has a "double-ended" cross in which three of the four fleurs-de-lis extend almost to the center.

Type "E"

Reign: CARLOS II
Dates: 1689-1700
Mintmark: "MO"
Assayer: "L"

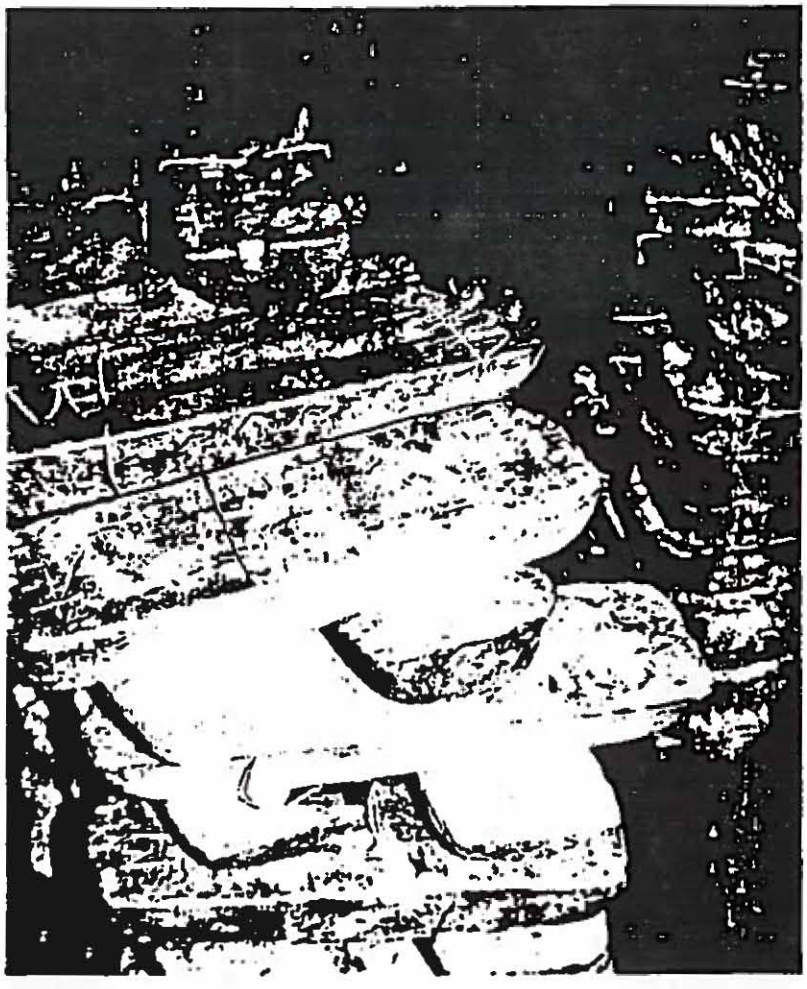
Description: Aragon has a single palet: there are two bars in Austria and three bendlets in the Low Countries. Flanders and Tryrol are centered in the Spanish shield and their chief is the base of the triangular shield of Granada. The reverse is a double-ended or box cross.

SILVER BULLION.

Most of the bars of silver bullion recovered from the Atocha can be matched to the ship's manifest preserved in the Archive of the Indies in Seville. Each bar is usually stamped with a talley number and the ley, or fineness which is expressed as a number of points out of a possible 2,400. Most bars have a fineness of about 2,380 making it almost fine silver. On most of the bars there also appears the mark of the merchant consigning the bar into the ship's register. Sometimes an individual consigns a bar on behalf of another. Some bars are for the account of Royal Officials, while, another significant group are those listed as 'A' series bars. These bars comprise part of the quinto real or Royal Fifth from the mine at Potosi for the year and are stamped with the initial 'A'. Many bars also show the pronounced bite' where the assayer has removed a sample of the silver for testing.

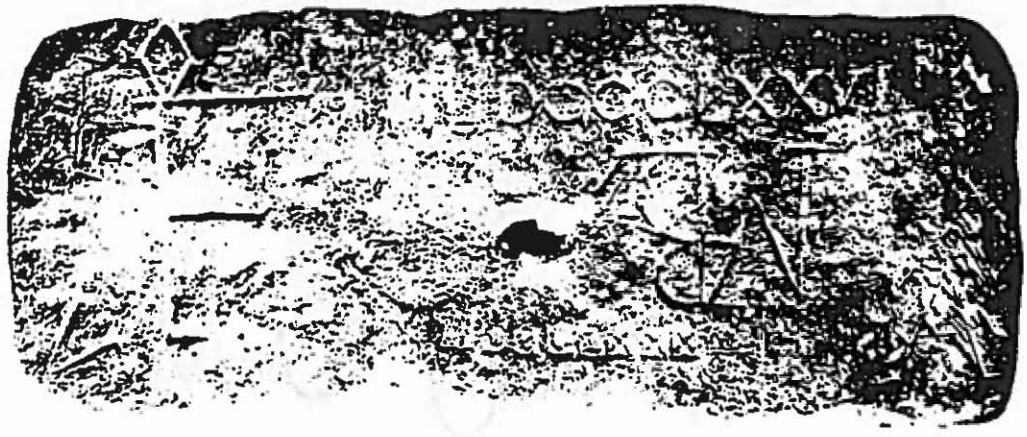
Some representative bars from the Atocha are shown below. Any silver bullion located on the Pilar can be reasonably expected to take a similar format to those shown.

SILVER BULLION
of
NUESTRA SEÑORA DE ATOCHA



• 318 A SILVER BAR
RECOVERED FROM THE WRECK OF *NUESTRA SEÑORA DE ATOCHA* IN 1985

84 lb., 7.68 oz. (31.74 kg.)
Fineness 2380
Class 0.9
J. Delgado account of de Mercado



• 319 A SILVER BAR
RECOVERED FROM THE WRECK OF *NUESTRA SEÑORA DE ATOCHA* IN 1985

78 lb., 6.08 oz. (29.44 kg.)
Fineness 2380
Class 1.0
Royal Officials

POTTERY AND CERAMICS CHARACTERISTICS.

This section deals with the various types of pottery and ceramics likely to be encountered on the Pilar site. Tables and examples are shown on the following pages which give examples of the classifications used and the date ranges which those classifications represent.

Fig. 4.1. *General forms of Hispanic ceramics*

(After Deagan, 1988)

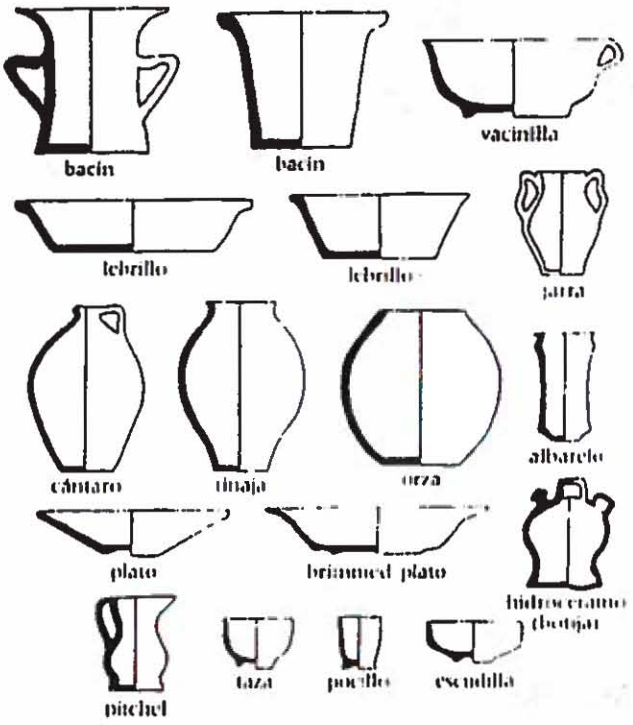
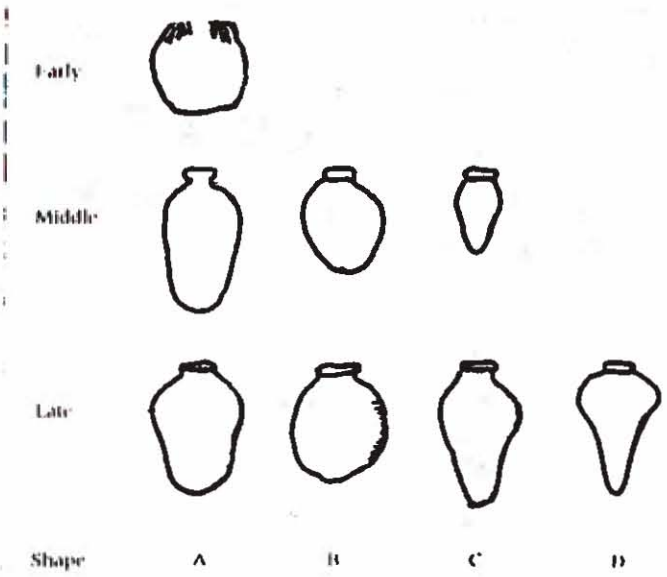


Fig. 4.2. *Forms of Olive Jars (after Goggin 1960:28)*



(After Deagan, 1988)

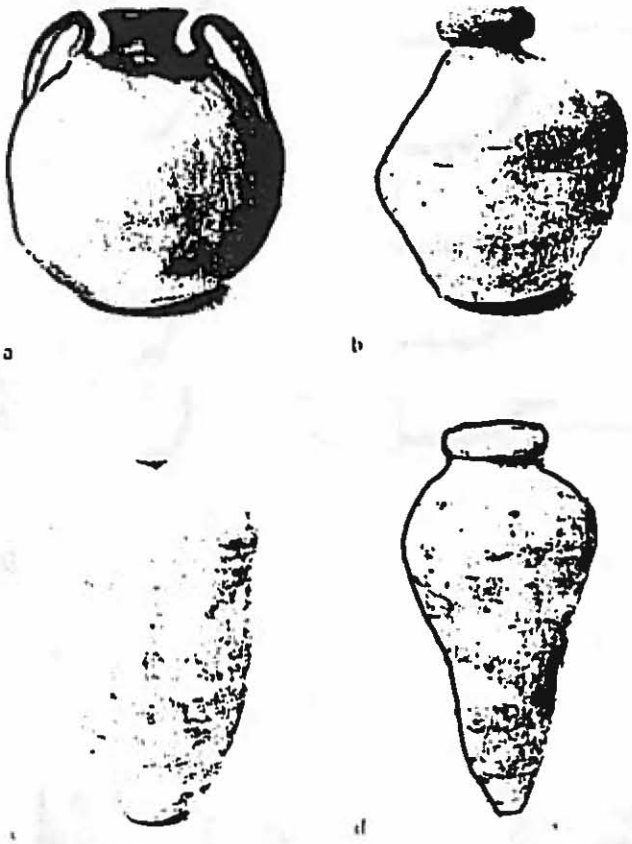
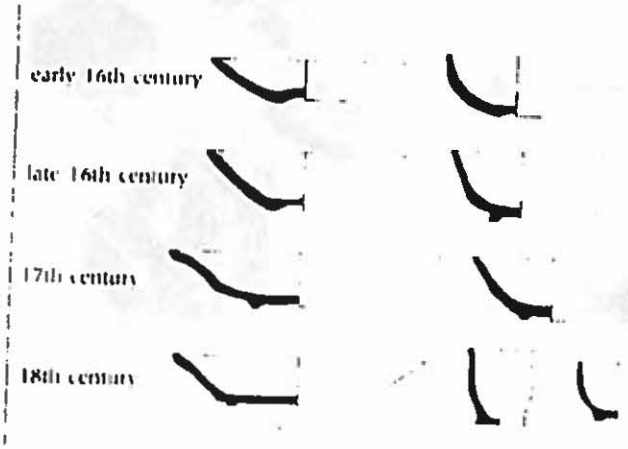


Fig. 4.24. *Forms of Old World Morisco and Renaissance vessels (after Lister and Lister 1982:47, fig. 4-3).*



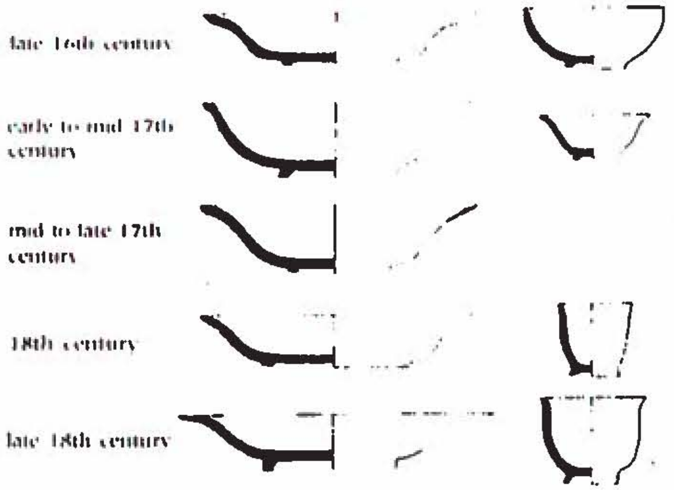


Fig. 4.38. *General forms of Mexican majolica vessels, with brimmed plates in the lefthand column and tazas (or pocillas) in the right (after Lister and Lister 1982 and Goggin 1968)*

(After Deagan, 1988)

Fig. 4.12 *[illegible] ca. 1580 from St. Augustine (SA-26-1) [illegible] cm high, reverse of a*

Fig. 4.14. *Mexican Red Painted earthenware, ca. 1585, from St. Augustine (SA–16–4–403), HSAPB collections. (g) 5.6 cm at widest point.*

(After Deagan, 1988)

Fig. 4.52. *Panamanian majolica seventeenth century, from Panama Viejo. ENM collections. a–c Panama Polychrome. d–e Panama Blue on White. (d) 8.3 cm at widest point. f–g. Panama Polychrome "B"*

Fig. 4.43. *Abó Polychrome/Puebla Polychrome bowl seventeenth century, from Santo Domingo. 14.5 cm high, MCR collections. Upper portion is Abo Polychrome, lower portion is Puebla Polychrome*

(After Deagan, 1988)

Fig. 4.44. a. *Puebla Polychrome late seventeenth century, from St Augustine. 11.1 cm wide Castillo de San Marcos collections. b-d. Castillo Polychrome, late seventeenth century, from St. Augustine. (b) Castillo de San Marcos collections. (c) SA-34-2, HSAPB collections. (d) SA-36-4, HSAPB collections*

Fig. 4.60. *Oriental porcelain eighteenth century from 1733 San José wreck: a-b. Japanese "Old Imari" vase bottle with fugitive overglaze on underglaze blue and white UDAHRM collections. c-d cups with underglaze blue on white (c) 8.9 cm high*

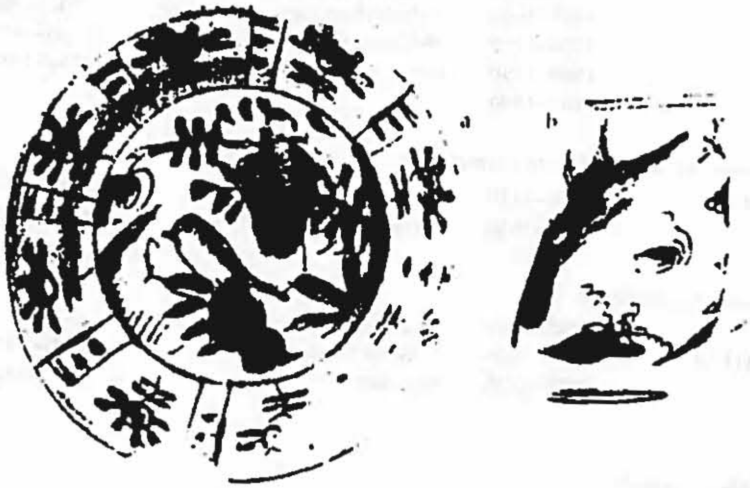


Fig. 4.57. Ming porcelain from the Concepcion wreck [illegible] collections: a, Kraakporcelain plate, 13.3 cm in diameter; b, Wan Li porcelain.

Fig. 4.58. Oriental porcelain from St. Augustine, HSAPB collections: a–b, Kraakporcelain, ca. 1580–1600: (a) SA-26-1-118, 4.5 cm wide at top, (b) SA-26-1-1[illegible]; c–e, Ming porcelain, ca. 1580–90: (c) SA-34-1-122, with "[illegible]" mark, (d) SA-26-1-480, (e) SA-34-1-64, reverse of a plate; f, "Chinese Imari" with gold and red overglaze, early eighteenth century; g, "powder blue" porcelain, ca. 1700–1750, SA-7-1-17[illegible]; h–i, Ch'ing-dynasty porcelain with underglaze blue on white, eighteenth century: (h) SA-[illegible]-170, (i) [illegible]

(After Deagan, 1988)

Table 2. Date Ranges for Hispanic Ceramics in Spanish Colonial Sites (After Deagan, 1988)

I. Coarse Earthenware

A. Unglazed Coarse Earthenware

Olive Jar, early	1490–1570	Feldspar Inlaid, redware	1530–1600
Olive Jar, middle	1560–1800	Orange Micaceous	1550–1650
Olive Jar, late	1800–1900	Hidroceramo, tan or red paste	1700–1800
Bizcocho	1500–1550	Hidroceramo, greyware	1780–1820
Redware	1500–1750	Greyware	1750–1850
Storage Jar	1500–1800		

B. Burnished, Painted or Slipped Coarse Earthenware

Mexican Red Painted	1550–1750	Pisan slipware	1600–1650
Yucatán Colonial	1570–1650	Guadalajara Polychrome	1650–1800

C. Lead-Glazed Coarse Earthenware

Melado	1490–1550	Black Lead-Glazed Coarse Earthenware	1700–1770
Green Bacon/Green Lebrillo	1490–1600		
El Morro ware	1550–1770	Rey ware	1725–1825

II. Majolica

A. Old World Majolica: Spanish

1. Moorish-Influenced Spanish Majolica		Sevilla Blue on White	1530–1650
Lusterware	1490–1550	Sevilla Blue on Blue	1550–1630
Cuerda seca ware	1490–1550	4. Talaveran-Style Spanish Majolica	
2. "Morisco ware"		Talavera Polychrome	1550–1600
Isabela Polychrome	1490–1580	Talavera Blue on White	1600–1650
Yayal Blue on White	1490–1625	Ichtucknee Blue on White	1600–1650
Columbia Plain	1490–1650		
Santo Domingo Blue on White	1550–1630		
3. Italianate Spanish Majolica		5. Catalonian Spanish Majolica	
Capara Blue	1490–1600	Catalonia Blue on White	1760–1820
Sevilla White	1530–1650		

B. Old World Majolica: Italian

Montelupo Polychrome	1500–1560	Faenza White	1550–1600
Ligurian Blue on Blue	1550–1600	Faenza Compendiario	1550–1600

C. New World Majolica: Mexico City

1. Fine-grade wares		2. Common-grade wares	
Mexico City White	1580*–1650	Mexico City Blue on Cream	1600–1650
Fig Springs/San Juan Polychrome	1580*–1650	Mexico City Green on Cream	1600–1650
San Luis Blue on White	1580*–1650	Aucilla Polychrome	1650–1700
	(*1575 in Mexico)	San Luis Polychrome	1650–1750
		Santa Maria Polychrome	1650–1760

Table 2 cont. (After Deagan, 1988)

D. New World Majolica: Puebla			
Mt. Royal Polychrome	1630–85	Puebla Blue on White	1700–1850
Abó Polychrome	1650–1750	overall design format	1700–1750
Puebla Polychrome	1650–1725	wavy line-band variant	1775–1825
Puaray Polychrome	1675–1700	green variant	1775–1825
Castillo Polychrome	1680–1710	San Elizario Polychrome	1750–1850
San Agustin Blue on White	1700–1730	Atantama Polychrome	1750–1800
Huejotzingo Blue on White	1700–1850		
E. New World Majolica: Nineteenth-Century Mexican Types			
Nopaltepec Polychrome	1725–1825	Tumacacori II	1810–40
Orangeline Polychrome	1800–1850	Tumacacori III	1840–60
Teteplama Black on White	1800–1850	Nineteenth-century complex	1800–1900
Tumacacori I	1780–1820		
F. New World Majolica: Panamanian			
Panama Plain	1575–1650	Panama Blue on White	1600–1650
Panama Polychrome "A"	1600–1650	Panama Blue	1600–1650
Panama Polychrome "B"	1600–1650		
G. New World Majolica: Miscellaneous Utilitarian Types			
Marine ware	1700–1775	Blue-Green Basin	1750–1820
Marine ware, decorated variant	1700–1750		
III. Porcelain in Spanish Colonial Sites			
A. Chinese			
1. Ming	1550–1644	2. K'ang Hsi	1662–1722
Kraakporcelain	1550–1640	"Chinese Imari"	1700–1750
variety 1	1550–70	monochrome brown porcelain	1700–1750
variety 2	1560–80	"powder blue" porcelain	1710–50
variety 3	1575–90	overglaze-enamel porcelain	1720–80
variety 4	1580–1610	3. Canton	1790–1835
variety 5	1600–1625		
B. Japanese "Old Imari" Porcelain	1660–1753		
IV. Stoneware			
Brown Cologne Stoneware, relief molded	1550–1600		

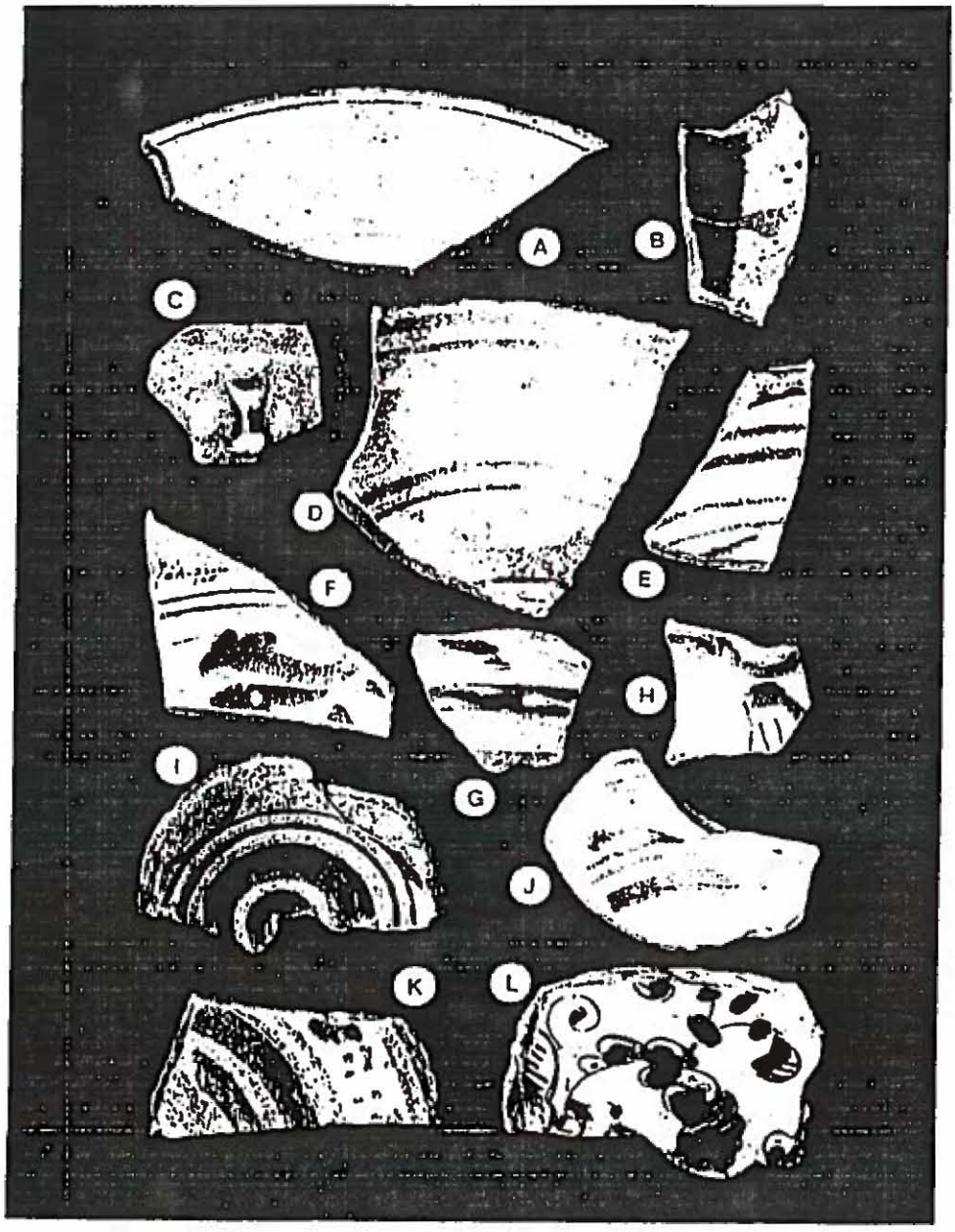


Plate 1 (After Deagan, 1988)

Plate 1. 16th century Morisco ware : A-C Columbia Plain. (A) plato sherd SA-26-1-128 HSAPB collections. (B) green-and-white variant, pre-1550 from Jacagua, Dominican Republic, FSM collections. (C) escudilla sherd with green appliqued handle, pre-1550, from La Vega Vieje, Dominican Republic, FSM collections ; D-E, Yayal Blue on White, (D) bowl sherd SA-36-4-92, HSAPB collections, (E) sherd, from Convento de San Francisco, Dominican Republic, FSM collections ; F-H, Santo Domingo Blue on White, HSAPB collections ; (F) SA-26-1-106, (G) SA-26-1-73, (H) SA-36-4; I-K, Isabela Polychrome, (I) sherd from Juandolio, Dominican Republic, FSM collections, (J) rim, SA-26-1-176, HSAPB collections, (K) body, SA-36-4-50, HSAPB collections, (L) Talaveran-type Polychrome, from Convento de San Francisco, Dominican Republic, FSM Collections.

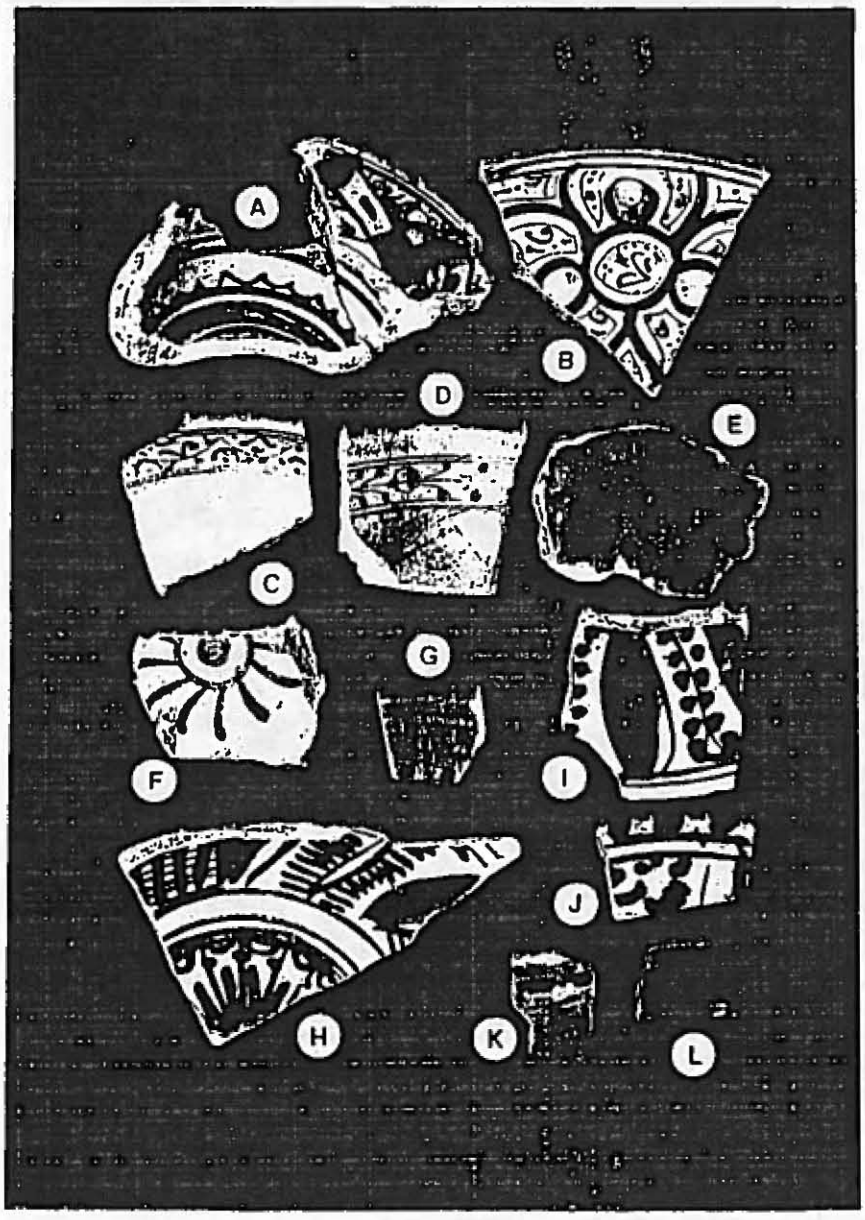


Plate 2 (After Deagan, 1988)

Plate 2. 16th century Ligurian and Italianate ware : A-B Montelupo Polychrome, FSM collections, (A) from La Vega Vieja, Dominican Republic, (B) from Convento de San Francisco, Dominican Republic, C. Sevilla Blue on White, from La Vega Vieja, Dominican Republic, FSM collections; D. Ligurian Blue on Blue, from Azua, Dominican Republic, FSM collections ; E-G. Sevilla Blue on Blue, HSAPB collections, (E-F) Sa-26-1-160, (G) SA-36-4-208; H-J. Ichtucknee Blue on White, HSAPB collections, (H) SA-26-1-160, (I) SA-36-4-92, (J) SA-10-1-15; K-L. Caparra Blue, HSAPB collections, (K) SA-36-4-156, (L) SA-10-1-1.

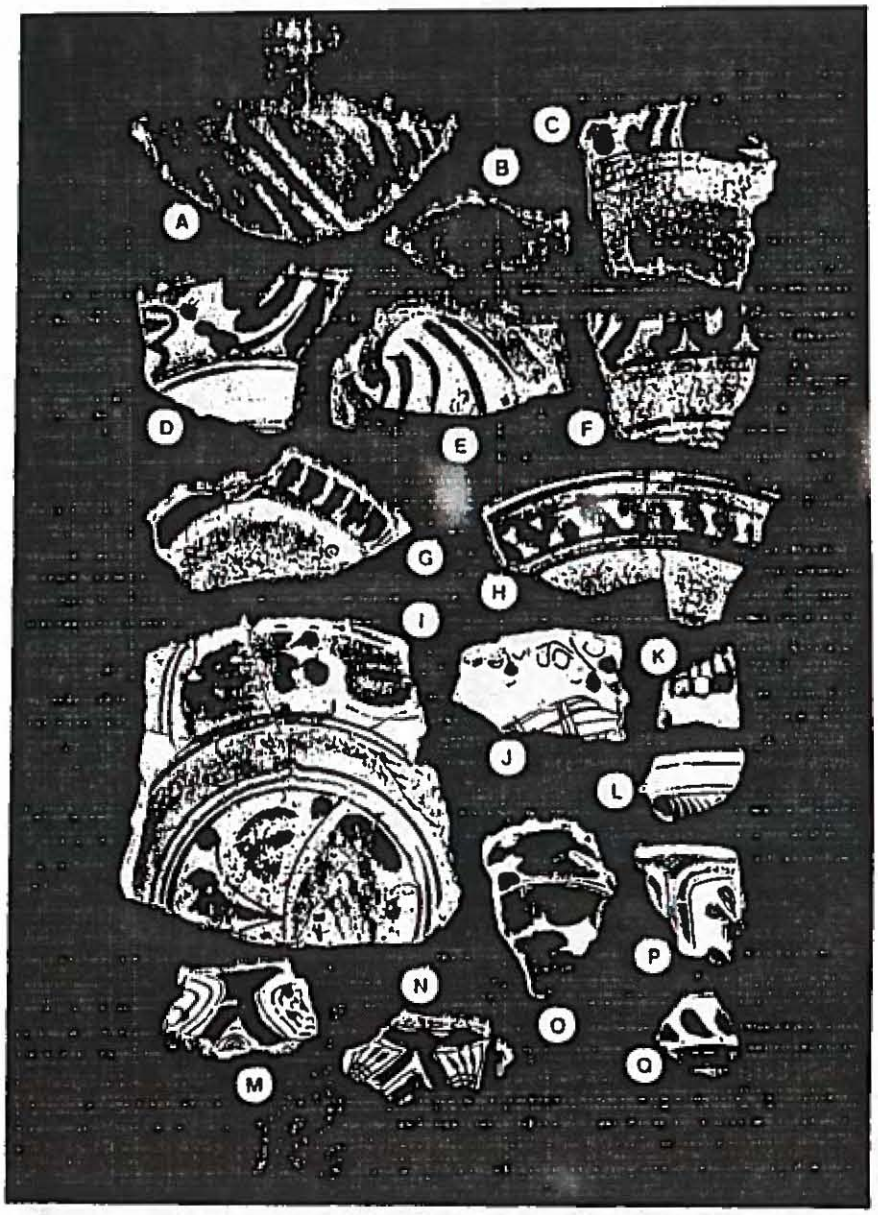


Plate 3 (After Deagan, 1988)

Plate 3. 17th century Mexican majolica, HSAPB collections expect where noted : A, Mexico City green on Cream, TC ; B, Mexico City Blue on Cream, RC ; C-D San Luis Blue on White, TC ; E-F Fig Springs/San Juan Polychrome, (E) TC, (F) MS11; G-H Aucilla Polychrome, (G) SA-7-5-6, (H) SA-27-18-10; I, San Luis Polychrome, FSM-TC collections; J-L Abo Polychrome, (J) SA-34-2-163, (K) TC, (L) SA-27-18-7; M-N Puebla Polychrome, (M) TC, (N) SA-4-E10; O Castillo Polychrome, FSM collections, B-11; P, Puaray Polychrome SA-34-2-72; Q, Mt. Royal Polychrome, TC.

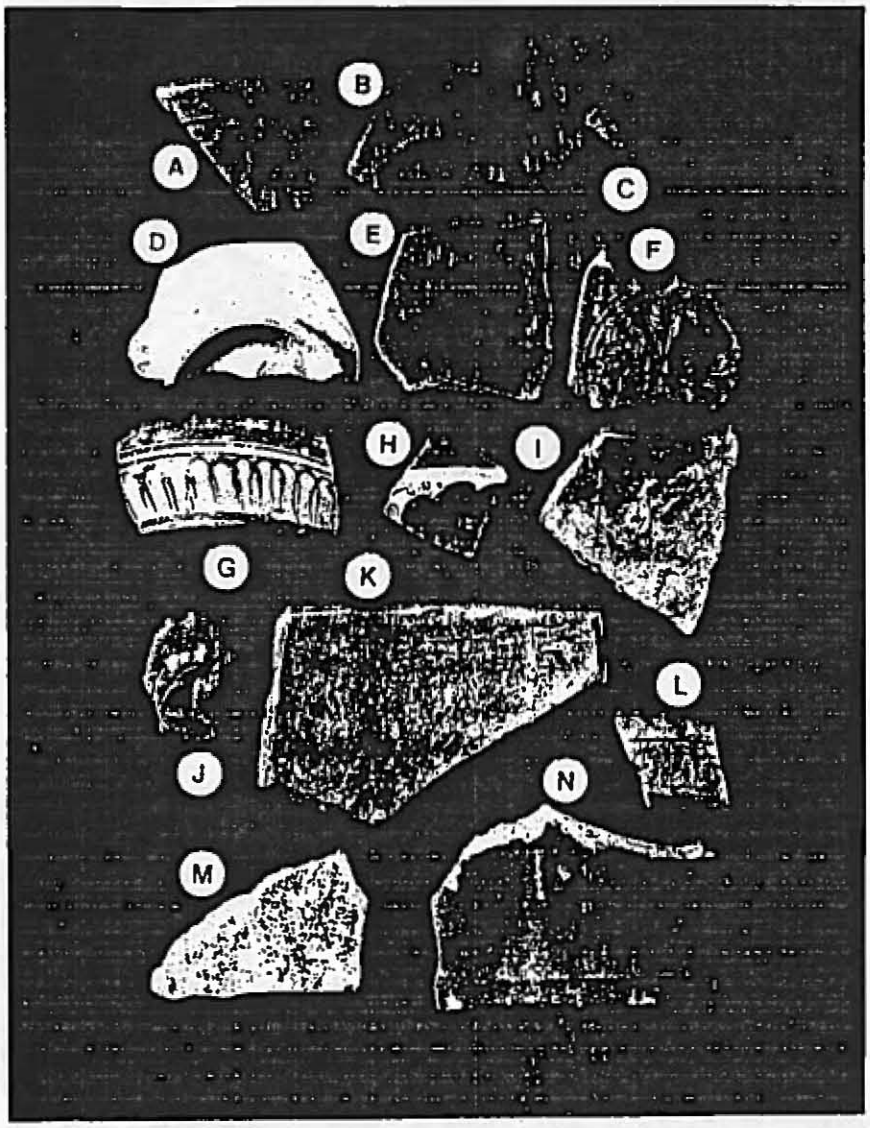


Plate 4 (After Deagan, 1988)

Plate 4. Mexican majolica from Puebla, Mexico, HSAPB collections: A-B, Puebla Blue on White, (A) SA-7-4-66, (B) SA-10-4; C. Playa Polychrome, TC ; D, Huejotzingo Blue on White, TC ; E-H San Augustin Blue on White, (E) SA-7-5-1, (F) SA-7-7-315, (G) reverse, TC ; H-J Aranama Polychrome, (H) TC, (I) SA-36-4-284, (J) SA-7-5-1 ; K, Nopaltapee Polychrome, late Aranama tradition TC ; **L-O , Panamanian majolica from Panama Vieja,** FSM collections, (L) Panama Plain, (M) Panama Polychrome "A", (N) Panama Polychrome "B" , (O) Panama Blue on White.

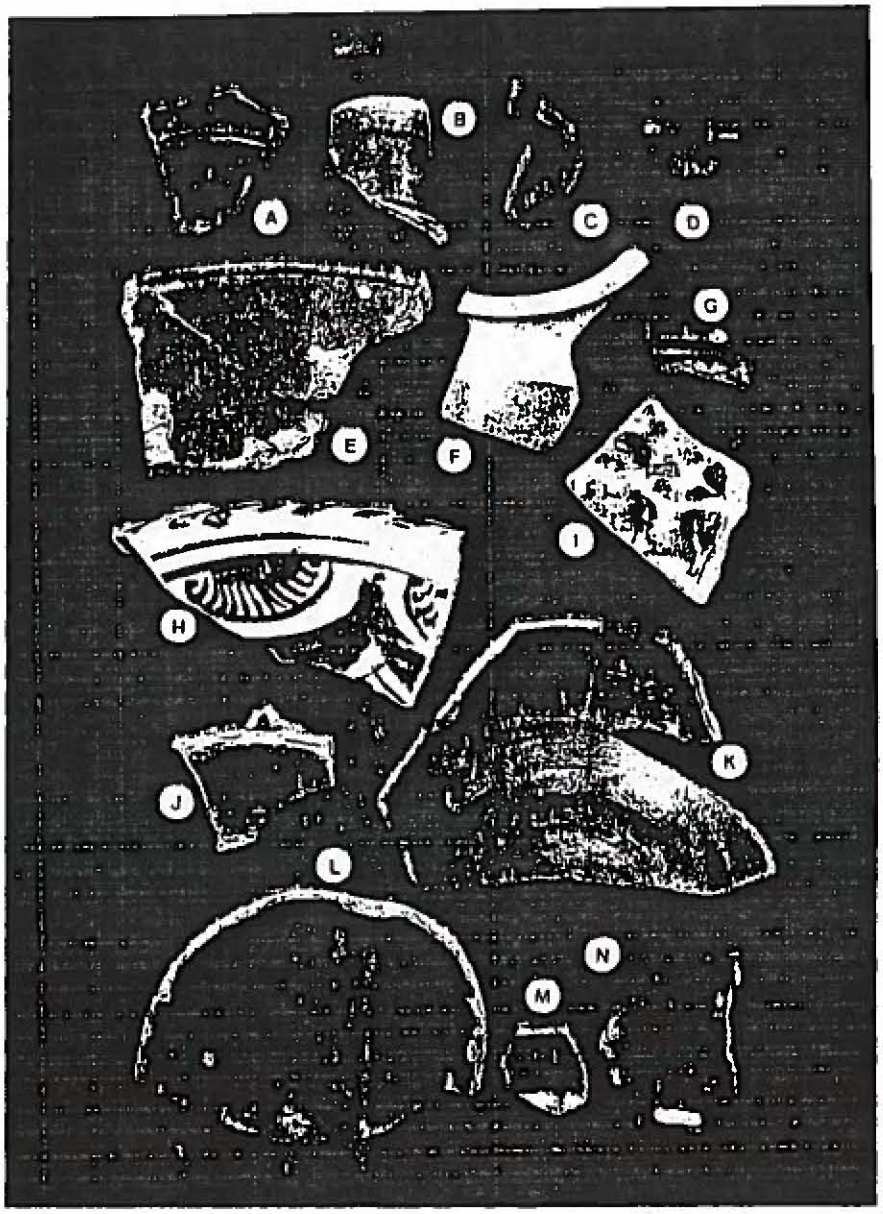
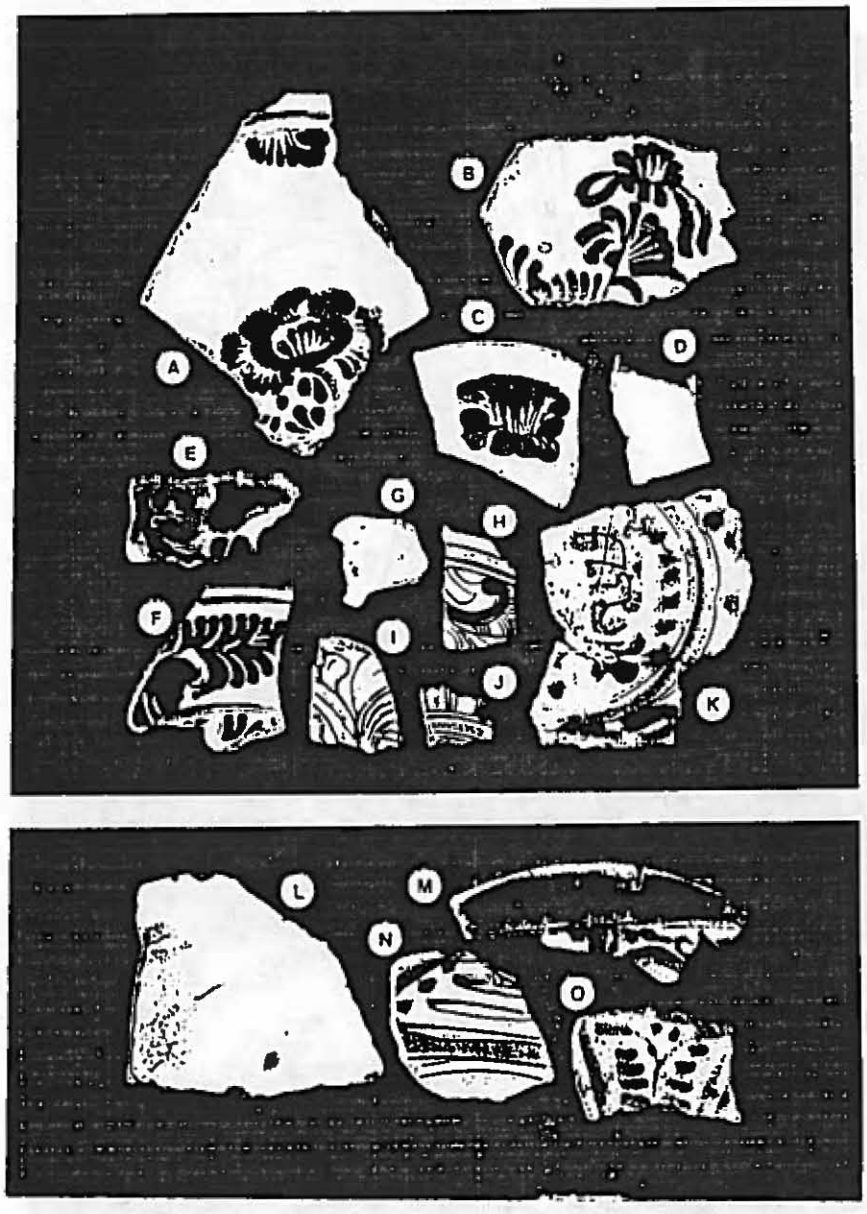


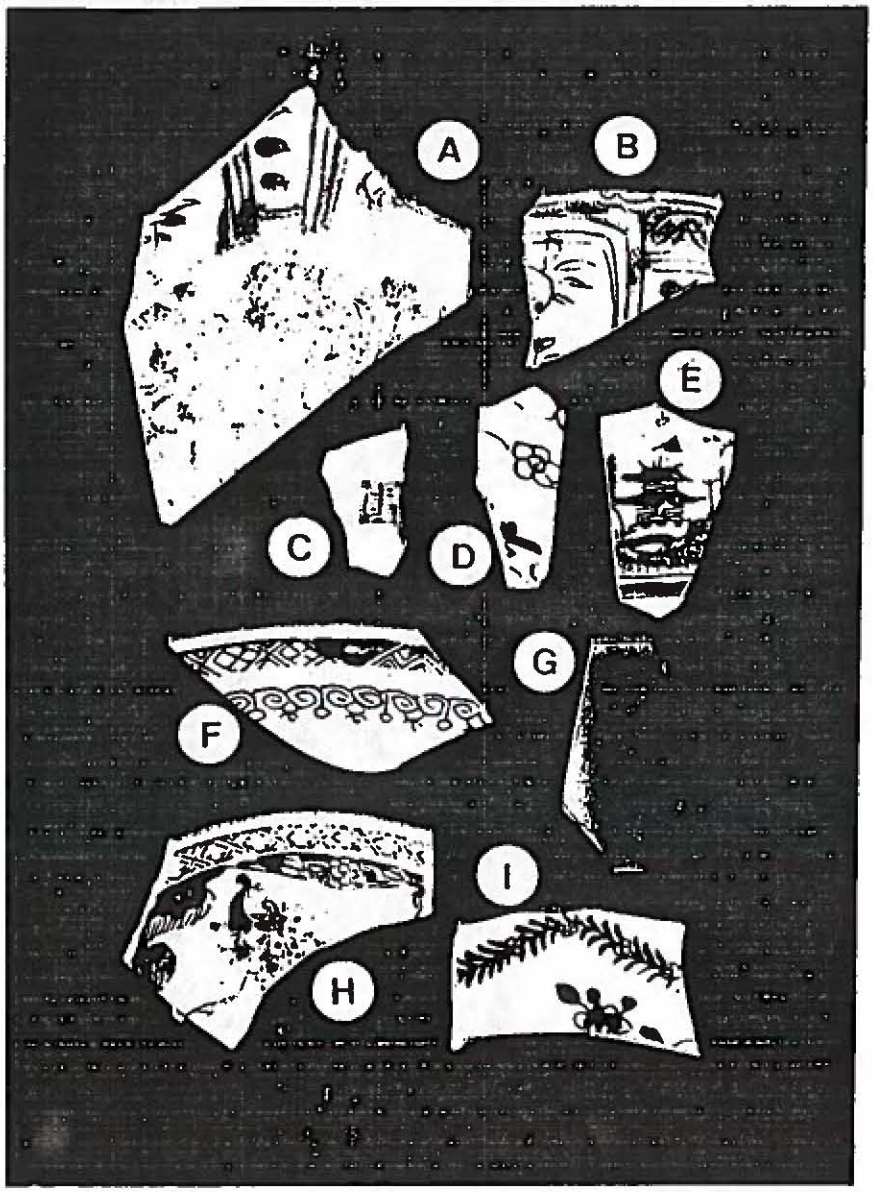
Plate 5 (After Deagan, 1988)

Plate 5. Glazed utilitarian earthenware , HSAPB collections except where noted: A-B, Melado, from La Isabela, Dominican Republic, FSM collections, (A) with brown design ; C-D green-glazed red earthenware, (C) handle, ca 1580, SA-26-1-430, (D) sherd 16th century, SA-34-2-118 ; E, Green Basin, SA-34-2-43 ; F-G, Marine ware, (F) TC, (G) SA-7-1-15 ; H-I Blue-Green Basin, (H) SA-27-18-R, (I) SA-5-3-3 ; J-K, El Morro ware, (J) SA-7-4-158, (K) SA-7-5-1 ; L-M, Rey ware, (L) SA-34-1-479, (M) SA-27-18-3 ; N, Black Lead -Glazed Coarse Earthenware, SA-26-1-435.



(After Deagan, 1988)

Plate 6. Unglazed utilitarian earthenware , HSAPB collections : A-C, Orange Micaceous, (A) SA-36-4-203, (B) SA-26-1-122, (C) SA-26-1-0 ; D, Bizocho SA-34-2-42 ; E-F Mexican Red painted, (E) Sa-26-1-125, (F) SA-26-1-90 ; G-H Guadalajara polychrome, (G) SA-34-2-85, (H) Sa-7-7-280 ; I-J Feldspar Inlaid Redware, TC ; L, Fine Orange (Yucatan origin), SA-26-1-84 ; M, Yucatan Colonial, SA-26-1-108 ; N, Greyware, TC.



(After Deagan, 1988)

Plate 7. Oriental porcelain , HSAPB collections : A-B, Kraakporcelain, (A) SA-26-1-118, (B) TC ; C-E Ming Porcelain, (C) with "goodwill" mark, SA-34-1-322, (D) SA-34-1-64, (E) SA-26-1-480 ; F-I Ch'ing-dynasty porcelain, (F) TC, (G) dark "powder blue" porcelain with fugitive overglaze, TC, (H) with overglaze red and gold decoration, TC , (I) SA-36-4-370.

SPANISH GLASS BEAD CHARACTERISITCS.

Spanish Colonial sites on land and underwater invariably produce quantities of glass beads which were used both as trade goods and as personal decoration. These artifacts can be classified into commmon groups and can be a valuable tool to accurately date a site. There are a number of reference works on Spanish glass beads, but one of the most useful for early 16th century beads is *Smith and Good*, 1982. This work refers to particularly to beads found on early Spanish colonial sites.

Many of the beads found on sites are distinct and recognized "types" (that is, they exhibit a cluster of attributes that consistently and predicably occur together) that have been designated by type names (see, for example, *Fairbanks*, 1968). When they exist, such names will be used to refer to specific types of Spanish colonial beads located on the Pilar site. Those beads without formally defined type names will be described and designated by the appropriate *Kidd and Kidd* classification.

Descriptions of beads will ideally include the following characteristics :

1. **Manufacturing method** : wound, drawn or other.

2. **Construction** : (after *Stone*, 1974 : 88)
   a. Simple : a single layer of glass.
   b. Compound : two or more layers of glass.
   c. Complex : simple beads with applique or inlaid design.
   d. Composite : compound beads with applique or inlaid design.

3. **Shape** : spherical, oval, barrel, ring or olive (see Fig 7.1). ("Ring"-shaped beads have often been referred to as "doughtnut"-shaped beads. See *Sprague*, 1985 : 99).

4. **Color.**

5. **Modifying decoration** : marvering, tumbling, inlay, applique, enamel, carving or other.

6. **Diaphaneity** : opaque, transparent or transluscent.

7. **Size** : (after Kidd and Kidd 1970 : 66) seed (under 2mm), very small (2-4 mm), medium (4-6mm), large (6-10mm), very large (more than 10mm).

An additional characteristic of glass beads - that of **function** - is frequently encountered either explicitly or implicitly in the literature. *Stone* 1974, *Cleland* 1971, and *Sprague* 1985, address the issue of function, and distinguish "necklace" beads (strung as ornaments), "embroidery" beads (sewn on to clothing) and "rosary" beads. It is frequently difficult, however, to determine the special function of individual beads without detailed contextual information, so the function of beads will be given here only when such information is available. It should be noted, however, that the term "seed bead" is frequently used interchangeably with "embroidery bead" in terms of its function. "Seed bead" as used here refers to a size rather than to a functional category.

Examples of bead types are shown in following plates together with a table showing distributions and approximate date ranges of Spanish colonial beads.

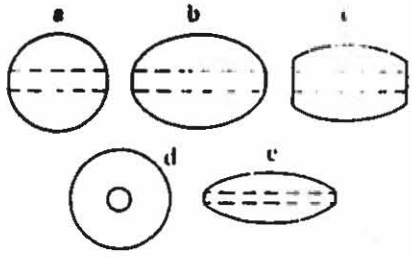


Fig. 7.1. *Shapes of beads. a spherical, b. oval, c. barrel, d ring, e. olive*

(After Deagan, 1988)

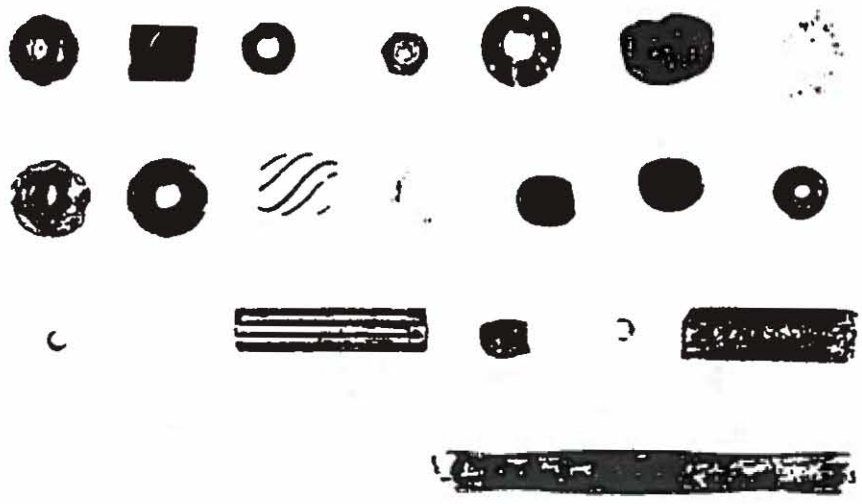


Plate 8

Plate 8. **Common bead varieties from Spanish colonial sites** *(left to right)* : *Top row* (from FSM collections) : Nueva Cadiz Twisted ca. 1520, from Nueva Cadiz, venezuela, A11123 ; Nueva Cadiz Plain, clear, ca. 1520, TC-A19926 ; *Second row :* (from FSM collections except where noted) : Nueva Cadiz, Plain, navey blue, ca. 1520, TC-AA19926 ; two seed beads (Cornaline D'Aleppo and blue tubular), ca. 1580, from Fountain of Youth park site, St. Augustine, 8-SJ-31-247 ; heat-altered faceted Chevron bead, ca. 1580, from Fountain of Youth Park site, St. Augustine, 8-SJ-31-194 ; tubular faceted Chevron bead with red and white core, ca.1570, from Fountain of Youth Park site, St. Augustine, 8-SJ-31-295 ; two Gooseberry beads (from Hanmphreys Fullbright site, Alabama, and from FSM-TC collections (P2909), ca. 1650 ; *Third Row :* two heat-altered tubular beads (turquoise and navy blue), ca. 1630, from Fountain of Youth Park site, St Augustine, FSM collections, A3698 ; Cornaline D'Aleppo bead, ca. 1675, FSM-TC collections, A12935 : three heat-altered beads (opaque white, red-striped opaque white and opaque black with inlaid white stripes), ca. 1675, from Humphreys Fullbright site, Alabama, P2909 : black wire-wound bead with dot inlay, ca 1700, from St. Augustine, HSAPB collections, SA-16-23-1 : *Bottom row* (from St Augustine, HSAPB collections except where noted) : clear rasberry bead, ca. 1725, SA-7-4-175 ; blue barrel-shaped wire-wound bead, ca. 1725, SA-7-4-215 ; amber, doughtnut-shaped wire-wound bead, ca. 1725, SA-7-4-69 ; faceted, compound, heat-altered tubular bead (blue over blue), ca. 1800, SA-36-4-222 ; black, faceted, heat-altered tubular rosary bead, ca. 1750, SA-16-23-26 ; carved jet rosary bead, ca. 1700, SA-7-4-175 ; faceted true amber bead, 1550-1600, FSM-TC collections, 20924.

(After Deagan, 1988)

Table 4. Distributions and Approximate Date Ranges of Spanish Colonial Beads

Based on the samples from sites used in this study

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Nueva Cadiz																					
plain (IIIc)*	1500–1550	X	X	X																	
twisted (IIIc')	1500–1550	X	X																		
Compound blue/white drawn with white on red stripes (IIIbb)	1500–1550	X																			
Chevron (IVk)																					
faceted	1500–1580	X	X	X		X	X														
unmodified compound cane with red core, red/white layers, blue/white striped exterior (IIIk2)	1500–1600		X				X														
nonfaceted red white blue (IVk)	1550–1650		X			X	X														
nonfaceted, striped (IVk4)	1550–1650		X				X														
nonfaceted, blue red green white stripes (IVm)	1550–1650						X														
Gooseberry (IIb18–19)	1550–1750				X	X			X	X							X	X			
Eye (IIg)	1575–1625								X	X											
Cornaline d'Aleppo (IIIa3)	1575–1800					X											X	X	X		
Inlaid tear-oval shaped																					
black glass	1600–1650									X			X	X							
blood-red glass	1600–1650						X														

*All references in parentheses are to Kidd and Kidd 1970 type classifications.

Key

1. Nueva Cadiz, Venezuela, 1515–41
2. Puerto Real, Haiti, 1503–78
3. St. Marks Wildlife Refuge, Florida, ca. 1520–70
4. Sixteenth-century St. Augustine, 1565–ca. 1600
5. Santa Elena, South Carolina, 1566–87
6. Fountain of Youth Park, St. Augustine, 1565–1600
7. St. Catherines Island mission, Georgia, ca. 1600–ca. 1680
8. Concepcion wreck (Dominican Republic), 1641
9. Fig Springs, Florida, ca. 1613–56
10. Fox Pond, Florida, ca. 1630–56
11. San Luis de Talimali, Florida, 1633–1704
12. San Juan del Puerto, Florida, 1598–1702
13. Seventeenth-century St. Augustine, 1600–1702
14. Santa Rosa Pensacola, Florida, 1723–52
15. Spanish fleet wrecks, Florida, 1733
16. Eighteenth-century St. Augustine, 1702–63
17. Natchitoches sites, Louisiana, 1714–17
18. Guevavi mission, Arizona, 1700–1773
19. Second Spanish Period St. Augustine, 1784–1821
20. Collax Ferry, Louisiana, ca. 1780–1820

Table 4 cont.

(After Deagan, 1988)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Faceted tear-shaped																					
green (WIIc)	1600–1700												X								
Seed, wire wound (WW1b)																					
yellow, green	1500–1600	X																			
aqua, purple	1550–1600						X														
Seed, drawn cane (IIa)																					
white opaque	1500–1800	X					X					X									X
green	1550–1800						X					X									
turquoise	1550–1800				X		X			X	X							X	X		
navy	1550–1800						X											X			
clear	1550–1800						X			X	X								X		X
black	1550–1800																X	X			
Cornaline d'Aleppo (IVa)	1575–1820						X											X			X
black faceted (Ic4)	1650–1800											X								X	X
dark brown	1700–1800															X	X		X		X
blue/white stripes (IIb)	1700–1800																	X			
Simple tubular drawn																					
turquoise with white stripes (Ib)	1550–1750						X			X	X						X				
turquoise plain	1650–1750															X	X				
Heat-altered drawn, oval or spherical (IIa)																					
dark blue with spiral white stripes (IIb')	1500–1575	X	X	X																	
clear	1525–1600			X																	
purple	1525–1600			X		X															
purple with white stripes	1550–1600		X																		
opaque white							X				X										
blue/white stripes (IIb)	1550–1800		X														X	X			
turquoise	1575–1720								X	X	X						X				
dark blue with red on white stripes	1575–1650						X														
white/spiral blue stripes (IIb'7)	1650–1750											X						X			
white/red/green stripes (IIbb17)	1650–1750																	X			
dark brown with white trailed appliqué (IIj)	1675–1800														X		X		X		
Faceted tubular drawn (Ic)																					
blue	1500–1800	X																			
black	1500–1800				X												X				
purple	1500–1800						X											X			

Table 4 is continued on next page

(After Deagan, 1988)

Table 4 cont.

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Wire-wound plain spherical (WIb)																					
green	1630–1800										X			X	X	X		X			
black	1630–1800													X	X	X	X	X	X		
blue	1675–1800														X		X				
clear	1675–1800														X		X				
white	1675–1800															X	X				
Wire-wound spherical faceted (WIIc)																					
black	1675–1800														X		X	X			
blue	1700–1800															X	X				
clear	1700–1800														X	X	X				
green	1700–1800																X				
white	1700–1800																	X			
Wire-wound ring (WId)																					
amber	1700–1775																X	X			
Wire-wound barrel, oval (WIc)																					
yellow	1650–1800															X					
white	1700–1800															X	X	X	X		
blue	1700–1800																X				
clear	1700–1800																X	X			
black	1700–1800																	X			
Raspberry (WIId)																					
clear	1700–1800														X		X				
blue	1700–1800															X	X				
Translucent, transparent red glass	1775–1820																			X	X
Small opaque "bugle beads"	1775–1850																			X	X
Compound faceted, drawn, clear blue over opaque turquoise	1775–1850																X		X	X	X
Wire-wound opaque white, black, gray, blue	1775–1850																			X	X
Lapidary Beads																					
Florida Cut Crystal	1550–1600			X			X														
True amber, spherical	1550–1600					X															
True amber, faceted	1550–1600			X																	
Carnelian, flat, carved	1550–1600						X			X											
Garnet, faceted	1550–1650						X							X							
Jet, spherical	1650–1750															X	X				
Jet, square-sectioned	1650–1775											X		X			X	X	X		
Jet, faceted	1700–1800															X	X	X		X	
Carnelian (elongated), faceted	1730–1800															X	X				

SPANISH GLASSWARE CHARACTERISTICS.

(After Deagan, 1988)

Fig. 6.14. *Drawings of miniature vials, or lagrimarios, after vials recovered in Caparra, Puerto Rico ca. 1500–1550. Museo de Caparra collections: a. luster-gilded glass, 2.5 cm high; b. fluted green glass, 3 cm high*

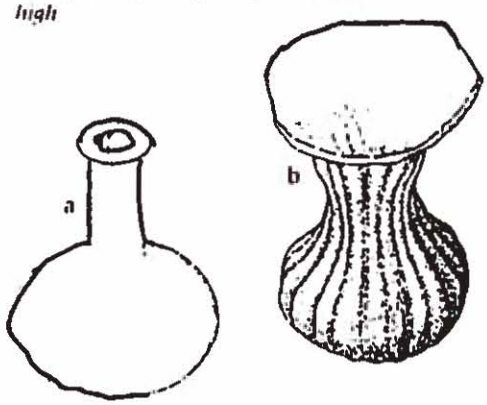


Fig. 6.15. *Pale aqua-green vial, ca. 1630–50 from Fig Springs site (8S-CO-1), Florida. 11.9 cm high. USM collections*

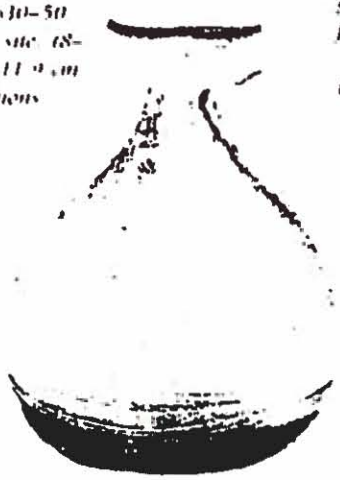


Fig. 6.16. *Vial with enameled blue, green, and black trail and drag decoration over milk glass, ca. 1650–1700, from St. Augustine (SA-14-2). 13.4 cm high. HSAPB collections*

(After Deagan, 1988)

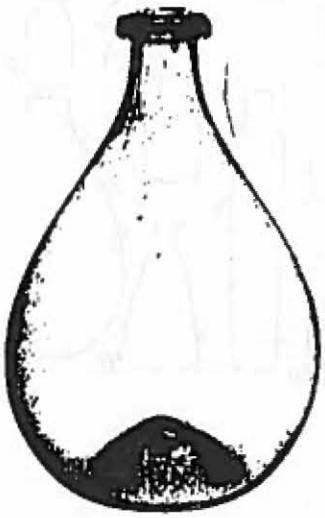


Fig. 6.4. *Light olive-green glass bottle, late seventeenth century. 15.7 cm high. Ross collection, HIM/SAHS. 78-176.42*

Fig. 6.6. *Light olive-green jar, possibly of Andalusian origin, ca 1700–1750, from St. Augustine (SA-16-23), 20 cm high. HSAPB collections*

Fig. 6.11. *Glass bottle seal, ca. 1730, from St. Augustine (SA-7-4-166), 3.8 cm at widest point. HSAPB collections (also in Shephard 1981: fig. 9.8)*

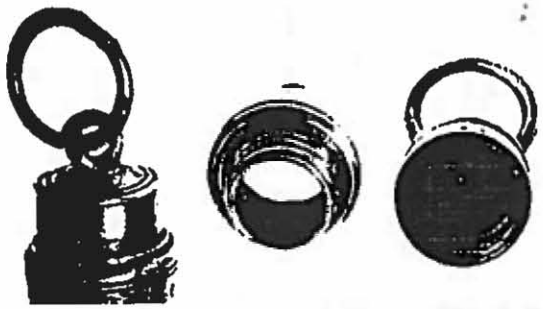
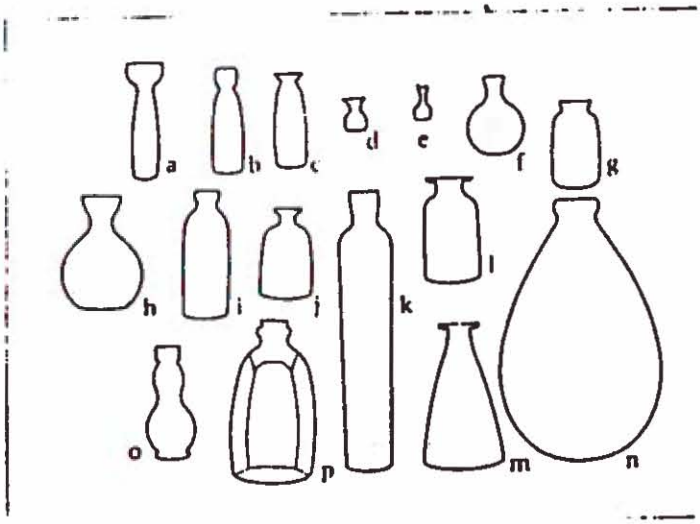


Fig. 6.5. *Pewter caps from square sectioned bottles, from 1715 fleet wrecks. 2.2 cm in diameter. FDAHRM collections*

Fig. 6.12. *Forms of Hispanic vials: a–l, ca. 1500–1550 (c possibly a lagrimatorio); g, ca. 1575; h, ca. 1630; i, ca. 1650–1770; j, ca. 1750; k–p, ca. 1740 (sources given on page 222)*

(After Deagan, 1988)



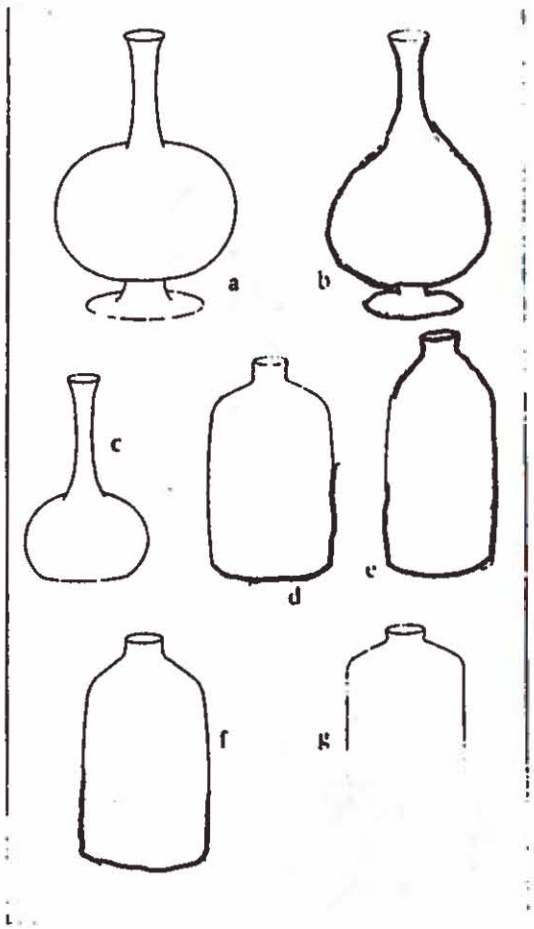


Fig. 6.2. *Forms of Hispanic bottles: a–b, ca. 1550; c, ca. 1630; d, ca. 1640; e, ca. 1700; f, ca. 1750; g, ca. 1760 (sources given on page 222).*

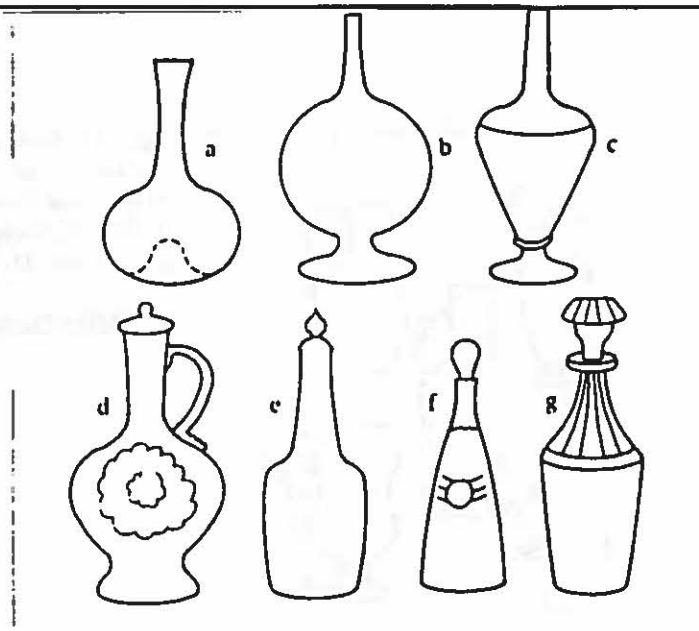


Fig. 6.37. *Forms of Hispanic decanters: a, ca. 1500–1550; b, ca. 1500–1600; c, ca. 1617; d, ca. 1741; e–f, ca. 1775–1800; g, ca. 1820 (sources given on page 222).*

(After Deagan, 1988)

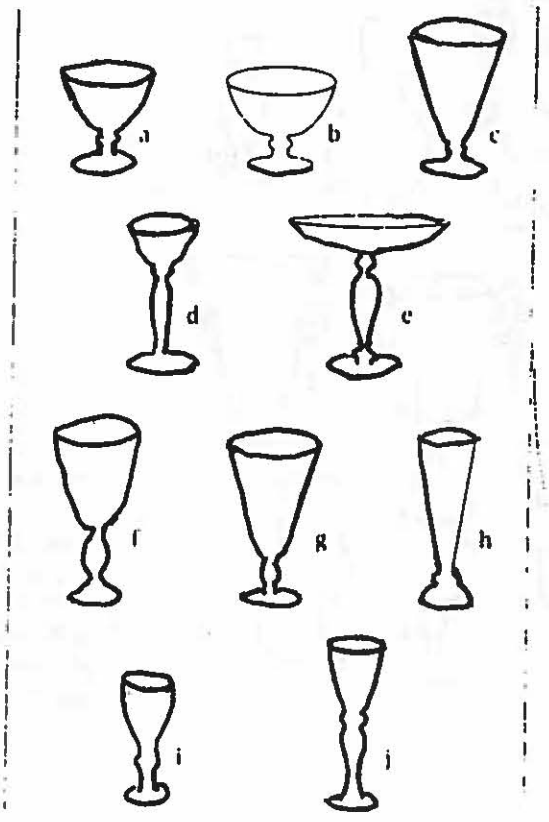


Fig. 6.33. *Forms of Hispanic goblets: a–b, ca. 1500–1550; c, ca. 1580; d–e, ca. 1500–1600; f–g, ca. 1615; h, ca. 1620; i, ca. 1724; j, ca. 1775–1800 (sources given on page 222).*

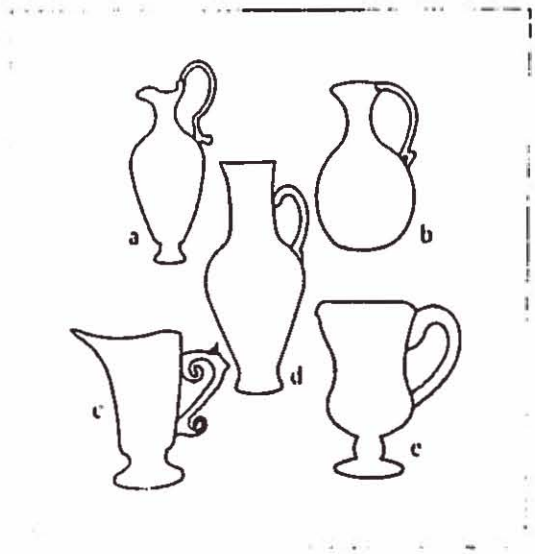


Fig. 6.41. *Forms of Hispanic pitchers and ewers*: a. *ca. 1500–1600;* b. *ca. 1590;* c. *mid-seventeenth century;* d. *ca. 1650;* e. *mid-eighteenth century (sources given on page 222)*

(After Deagan, 1988)

Fig. 6.42. *Forms of Hispanic vases and covered jars:* a–c. *ca. 1500–1600;* d. *early seventeenth century;* e–f. *ca. 1600–1660;* g. *ca. 1700–1750;* h. *mid-sixteenth century;* i. *early seventeenth century;* j. *late eighteenth century (sources given on page 222).*

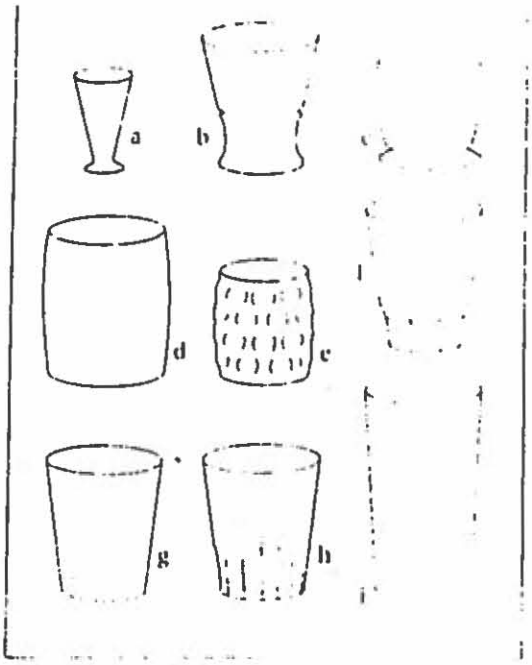


Fig. 6.25. *Forms of Hispanic tumblers: a, ca. 1550; b, ca. 1550–1600; c, ca. 1550; d, ca. 1620; e, ca. 1640; f, ca. 1724; g, ca. 1770; h, ca. 1800–1850 (sources given on page 222).*

(After Deagan, 1988)

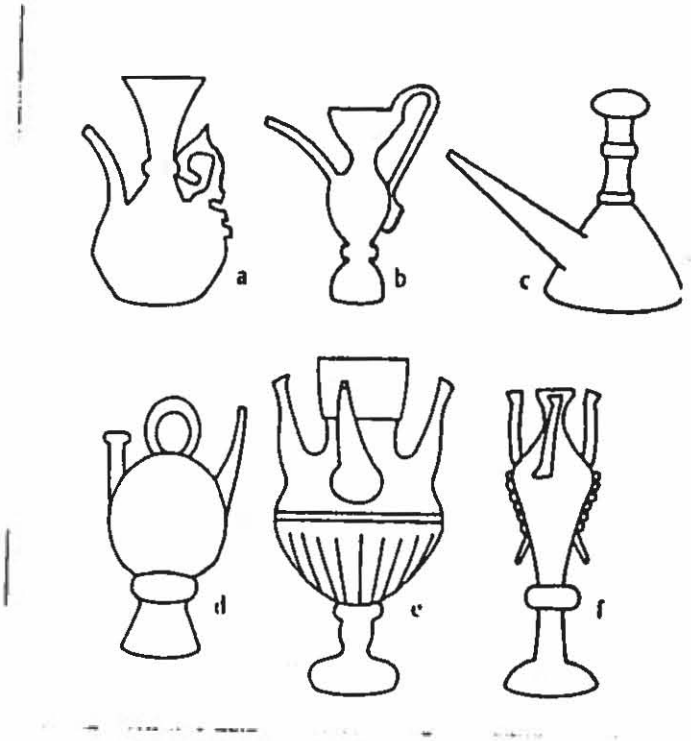


Fig. 6.45. *Forms of uniquely Hispanic glassware: a–c, porrones. (a) sixteenth century; (b) seventeenth century; (c) eighteenth century; d, canir; seventeenth through eighteenth centuries; e–f, almorratxas. (e) sixteenth century; (f) eighteenth century.*

APPENDIX E - ARCHAEOLOGICAL DATA FORM EXAMPLES.

This Appendix has examples of the following Project forms which are in use at present :

a. Daily Boat Log,

b. Dive Log,

c. Archaeological Log,

d. Primary U/W Artifact Recordation Sheet

d. Artifact Data Sheet,

e. Stabilization Lab Sheet,

f. Conservation Lab Sheet,

g. Artifact Inventory Example Record, and

h. Photographic Register Example Record.

i. Anchor Form.

j. Cannon Form.

THE PILAR PROJECT
DAILY BOAT LOG

BOAT _____ **DATE** _____

CAPT _____ **CREW** _____

DIVERS and/or PASSENGERS _____

TASK _____

WEATHER

Sunny ☐ Cloudy ☐ Overcast ☐ Rainy ☐

SEAS

Calm ☐ Slight ☐ Moderate ☐ Rough ☐

SURF

Nil ☐ 2-4 ft ☐ 4-6 ft ☐ 6-8 ft ☐

CURRENTS

Nil ☐ 0-1 knt ☐ 1-2 knt ☐ 2-3 knt ☐

SWELL

4-6 ft ☐ 6-8 ft ☐ 8-10 ft ☐ > 10 ft ☐

TIMINGS

Left Port	
Arrived Site	
Started Task	
Ceased Task	
Departed Site	
Arrived Port	

RESULTS _____

COMMENTS _____

CAPTAIN'S SIGNATURE _____

THE PILAR PROJECT
DIVE LOG

Date : _____ **Divers :** 1.....
2.....

Task : _____

Lat : **N Long :** **E**

Dive Mode : SCUBA : ☐ Hookah : ☐ Snorkel : ☐

Special Equipment : Liftbags/Nets : ☐ M/Detectors : ☐ Survey Eqpt : ☐ Excav Tools : ☐ Cameras : ☐ Scooters : ☐ Dredge : ☐ Airlift : ☐

Diver One :

Time In : _____
Time Out : _____
Bottom Time : _____
Max Depth : _____ ft

Deco Stops :
10 ft Mins : _____
20 ft Mins : _____

This days ☐ dive.

Diver Two :

Time In : _____
Time Out : _____
Bottom Time : _____
Max Depth : _____ ft

Deco Stops :
10 ft Mins : _____
20 ft Mins : _____

This days ☐ dive.

METHOD :

RESULTS :

COMMENTS :

DIVEMASTER'S SIGNATURE :

THE PILAR PROJECT
ARCHAEOLOGICAL LOG

DATE :

CAPTAIN :

BOAT :

CREW :

ARCHAEOLOGICAL STAFF :

CONSULTING STAFF :

OBJECTIVES :

RESULTS :

COMMENTS :

SUPERVISING ARCHAEOLOGIST

THE PILAR PROJECT
PRIMARY U/W ARTIFACT RECORDATION SHEET

DATE :..... BOAT :..... DIVERS :.....

ARTIFACT DATA

ZONE :..... SECTION :..... LAYER :.....

HOLE #	TAG #	U/W DESCRIPTION

THE PILAR PROJECT
ARTIFACT DATA SHEET

DATE :

ARTIFACT TAG REGISTRATION #

DETAILED DESCRIPTION :

SITE PROVENIENCE SECTION

SURFACE GPS FIX

LAT : deg min sec N ;
LONG : deg min sec E ;

TRILATERATION COORDINATES

BASE-LINE OFFSET MEASUREMENTS

GRID REFERENCES

PHOTOGRAMMETERY VIDEO DOCUMENTATION

CONTEXTS SECTION

ARCHAEOLOGICAL

STRATIGRAPHICAL/ DEPOSITIONAL

TREATMENTS SECTION

STABILIZATION

LAB STORAGE AREA

SIGNATURES

DIRECTOR OF ARCHAEOLOGY

TERRITORIAL ARCHAEOLOGIST

THE PILAR PROJECT
STABILIZATION LAB SHEET

DATE :

ARTIFACT TAG # :

RECORDER

LAB STORAGE AREA

TREATMENT

COMMENT

PHOTO

CONSERVATION/ RESTORATION

COMMENTS

ARCHAEOLOGICAL CONSERVATOR

THE PILAR PROJECT
CONSERVATION LAB SHEET

DATE :

ARTIFACT TAG # :

RECORDER

LAB STORAGE AREA

TREATMENT

SEE STABILIZATION SHEET DATED :

COMMENT

PHOTO

CONSERVATION/ RESTORATION

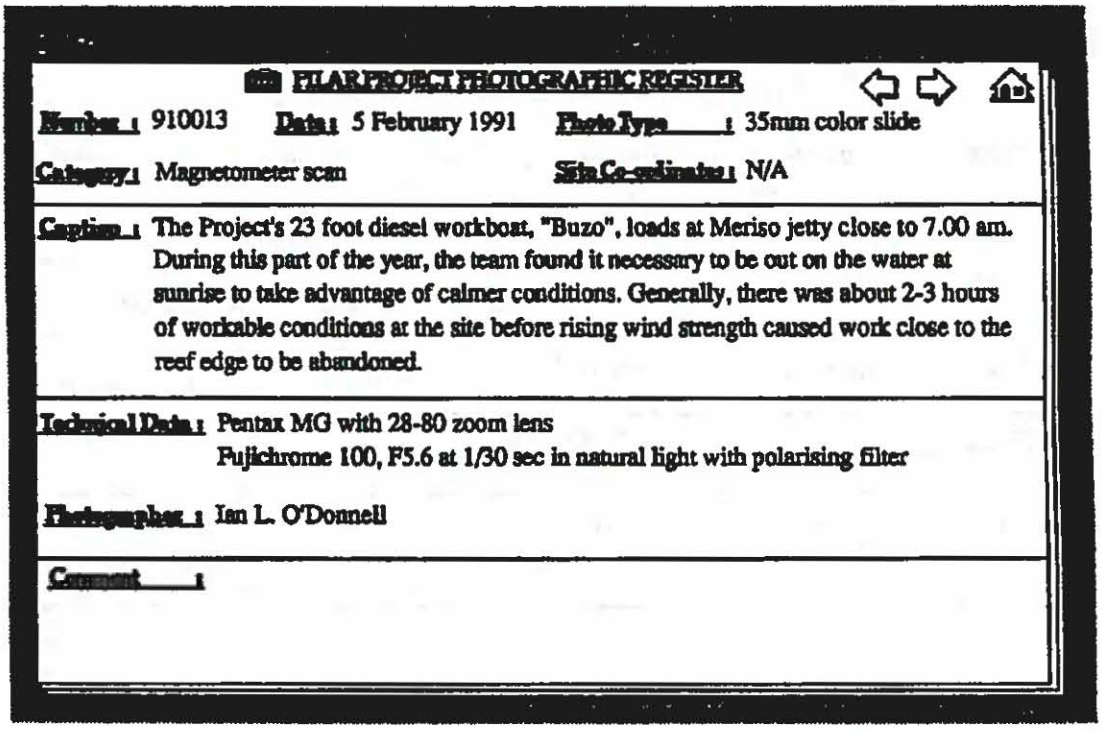
COMMENTS

ARCHAEOLOGICAL CONSERVATOR

EXAMPLE RECORD FROM THE PILAR PROJECT ARTIFACT INVENTORY SYSTEM

PILAR PROJECT ARTIFACT INVENTORY SYSTEM		
TAG # : 76382	DATE : 29 Sep 1991	FOUND AT : 1 : 3 : 16 : 4
DESCRIPTION :	Pewter tankard with hinged lid and moulded with four animal feet. Has handle attached at two points. Seems to be moulded in three parts. Good condition with light encrustation when found. No visible markings.	
DIMENSIONS :	Weight : 3lb 9.5 ounces untreated, height 12.75 inches, max diameter 4.5 inches, neck diameter 1.5 inches, feet height 1.2 inches	
IMAGES RECORDED	Sketch Historical Before After	
LABORATORY DATA :	IN : 30 Sep 1991 OUT : 8 Oct 1991	Lab Record
STORED AT : Bay 16 - L23S6	DISPOSAL :	ON :
COMMENTS :	Identical tankard in photo page 72 of Joe Doe's "Pewters of New Spain", 1990, Hassell, New York, (Congress 675438-9). This dated at circa 1680.	

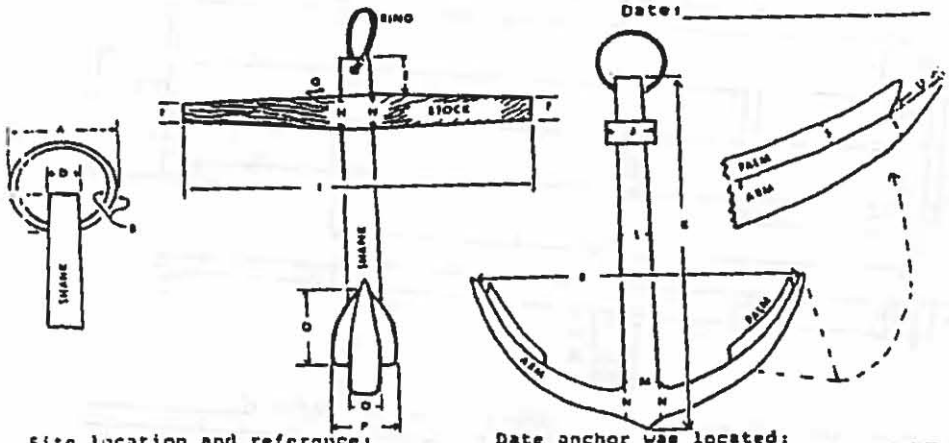
EXAMPLE RECORD FROM THE PILAR PROJECT PHOTOGRAPHIC REGISTER SYSTEM



ANCHOR DATA SHEET

Site name:_____

Date:_____



Site location and reference:_____

Location of anchor on site:_____

Date anchor was located:_____

Divers:_____

Recorder:_____

METRIC ATTRIBUTES

A. Ring diameter		
B. Ring thickness		
C. Top of shank to base of ring		
D. Top shank diameter		
E. Distance from top of stock to top of shank		
F. Stock width on each end	left	
	right	
G. Stock thickness next to shank		
H. Stock width each side of shank	left	
	right	
I. Stock length		
J. Stock thickness at ends	left	
	right	
K. Length of shank		
L. Mid-shank diameter		
M. Basal shank diameter		
N. Arm diameter each side of shank	left	
	right	
O. Thickness of arm		
P. Width of palms	left	
	right	
Q. Length of palms	left	
	right	
R. Distance between arm tips		
S. Palm thickness	left	
	right	
T. Arm thickness at end of palm	left	
	right	
U. Distance from end of palm to end of arm	left	
	right	

NON-METRIC ATTRIBUTES

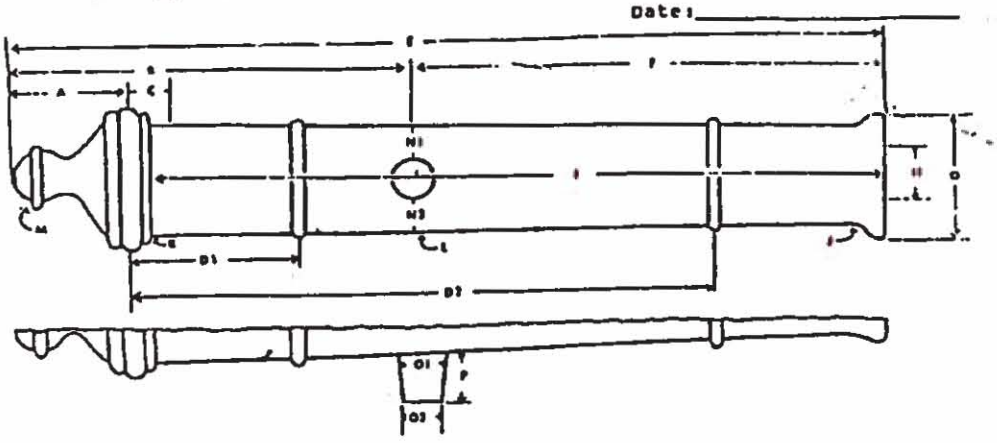
answer questions on reverse side

1. Direction of anchor shank in relation to NORTH.
2. Encrustation and anchor color.
3. If chain is present, what type?
4. Remaining wood and condition.
5. Stock type.
6. What is stock made of?
7. What is condition of stock?
8. Ring type and condition.
9. Markings.
10. Depth and description of bottom.
11. Draw anchor's individual characteristics and add any further comments on back.

CANNON DATA SHEET

Site name: _____

Date: _____



Site location and reference: _____

Location of cannon on site: _____

Date cannon was located: _____

Divers: _____

Recorder: _____

METRIC ATTRIBUTES

NOTE: Measurements requiring two readings for left and right sides should be taken viewing the cannon on the touchhole side (dorsal) from the cascabel down the tube.

A. Cascabel to breech reinforce _____

B. Cascabel to trunion _____

C. Reinforce to touchhole _____

D. Breech reinforce to each other reinforce band

	Distance	Thickness
1.	_____	_____
2.	_____	_____
3.	_____	_____
4.	_____	_____
5.	_____	_____
6.	_____	_____

write any additional reinforce measurements on back

E. Overall length _____

F. Trunion to muzzle length _____

G. Muzzle diameter _____

H. Bore diameter _____

I. Bore depth _____

J. Diameter behind muzzle flare _____

K. Diameter in front of breech reinforce _____

L. Diameter of tube at trunions _____

M. Diameter of cascabel _____

N. Vertical position of trunion on tube

1. trunion to dorsal _____

2. trunion to ventral _____

O. Diameter of trunion

1. at tube left _____ right _____

2. at ends left _____ right _____

P. Length of trunions left _____ right _____

Other: _____

NON-METRIC ATTRIBUTES

answer on reverse side

1. Depth to and description of bottom.
2. Type of sediment(s).
3. Lifting handles: description & necessary accompanying measurements.
4. Any other pertinent attributes: distinguishing marks, insignias, dates, color, condition, type of metal, etc.

MANILA GALLEONS REPORTED AS SHIPWRECKED.

YEAR	SHIP	EASTBOUND OR WESTBOUND	LOCATION	DURO V-PAGE	SCHURZ	POTTER
1568	San Pablo	E	Saipan	II 495	24-25	
1576	San Juanillo	E	?	II 496	258	440
1576	Espritu Santo	W	Philippines		258	
1589	?	E	Philippines	II 498		441
1589	?	E	Philippines	II 498		441
1590	San Filipe	W	Philippines	II 498		441
1596	Santa Catalina	W	At sea	II 499		441
1596	San Filipe	E	Japan		121-122	441
1599	San Agustin	E	California	III 487	240	462
1600	San Geronimo	E	Philippines	III 487	256	441
1600	Santa Margarita	E	Saipan	III 487	255-256	441
1600	San Antonio	?	At sea			442
1601	Santo Tomas	W	Philippines	III 487	256	442
1603	San Antonio	E	Off Japan	III 488	257-258	442
1603	Santa Margarita	W	Marianas	III 488		442
1603	Concepcion	E	Guam			442
1606	Jesus Maria	?	Philippines	III 488		
1609	San Francisco	E	Japan	III 489	109-124	442
1613	Buen Jesus	W	At sea			442
1620	NS de la Vida	E	Philippines		258	
1620	Jesus Maria	W	Philippines	III 490		443
1620	Santa Anna	W	Philippines	III 490		443
1621	San Nicolas	W	Philippines		259	443
1621	? (patache)	W	Philippines			443
1631	Madelena	?	Philippines	IV 450		443
1638	Concepcion	E	Saipan		259	
1639	San Ambrosio	W	Philippines	IV 451	259	443
1641	NS de Ayuda	E	California	IV 451		463
1646	San Luis	W	Philippines	IV 452		444

YEAR	SHIP	EASTBOUND OR WESTBOUND	LOCATION	DURO V-PAGE	SCHURZ	POTTER
1649	Encarnacion	?	Philippines		259	
1653	San Francisco Javier	?	Philippines	V 437		444
1654	San Diego	?	Philippines	V 437		444
1660	Victoria	?	Philippines	V 437		444
1679	San Antonio de Padua	?	Philippines			448
1690	NS del Pilar	W	Guam	V 439		444
1693	Santo Cristo de Burgos	E	At sea	V 439	259	444
1694	San Jose	E	Philippines	V 439	258-260	444
1705	San Francisco Xavier	E	At sea		260	444
1726	Santo Cristo de Burgos	E	Philippines	VI 490	260	444
1734	Santa Maria Medalena	E	Philippines			444
1735	San Cristobal	W	Philippines		260	445
1741	NS de la Guia	?	Philippines			448
1750	Pilar	E	At sea		260	445
1754	San Sebastian	E	California			464
1756	? (capitana)	W	Philippines	VI 490		445
1775	Concepcion	W	Marianas	VII 457-8	281	446
1782	San Pedro	E	Philippines		226	
1797	San Andres	E	Philippines	VIII 468	260	446
1797	Maria	?	Philippines	VIII 468		446
1802	Ferrolena	(Manila to Cadiz)	China	VIII 468		446

SHIPWRECKED MANILA VESSELS TRADING WITH CHINA.

YEAR	SHIP	EASTBOUND OR WESTBOUND	LOCATION	DURO V-PAGE	SCHURZ	POTTER
1583	?		Off Formosa	II 497		440
1587	San Martin		China	II 498		440
1598	? (capitana)		China	II 499		441
1598	? (almiranta)		China	II 499		441
1637	Capitana de Espana		Philippines	IV 451		443
1639	?		Off Formosa	IV 451		444

MANILA GALLEONS TAKEN BY BRITISH SHIPS
(From Schurz, page 15)

1587 Santa Ana

1709 Encarnacion

1743 NS de Covadonga

1762 Santisima Trinidad

SOURCES.

1. Armada Espanola by Cesareo Fernandez Duro. 8 Vols, Madrid, 1895-1902

2. The Manila Galleon by William L. Schurz. New York, 1939.

3. The Treasure Diver's Guide by John S. Potter Jr. New York, 1960.

The above sources were chosen as being the most reliable and reasonably complete works available on the subject of Spanish Pacific Shipwrecks. In each case, Philip Masters personally conducted extensive research at the Archivo General de Indias in Seville, Spain, the world's prime repository of Spanish Colonial Records.

"NAVEGACION ESPECULATIVA Y PRACTICA" EXCERPTS.

COLECCION CHIMALISTAC
DE LIBROS Y DOCUMENTOS ACERCA DE LA NUEVA ESPAÑA
31

PEDRO PORTER Y CASANATE

REPARO A ERRORES DE LA NAVEGACION ESPAÑOLA

Y

JOSE GONZALEZ CABRERA BUENO

NAVEGACION ESPECULATIVA Y PRACTICA

INTRODUCCION Y EDICION
POR
W. MICHAEL MATHES
(University of San Francisco)

EDICIONES JOSE PORRUA TURANZAS
MADRID MCMLXX

AL M. ILL^me. SEÑOR D. FERNANDO de Valdes, y Tamon, Cavallero del Orden de Santiago, Brigadier de los Reales Exercitos de su M. Governador, y Capitã General de las Islas Philipinas, y Presidente de la Real Audiencia, y Chancilleria de ellas &c.

MVY ILL^me. SEÑOR.

SVE questionmuy reñida sobre quien hà hecho mas bien al Mundo las Ciencias ò las Armas, y sobre quien se à de llevar la palma Minerva, ò Belona; mas quien cõsiderare q̃ las Ciencias se conservan debajo de la protecciõ de las Armas; y q̃ las Armas hàn llegado al mayor culmẽ de estimaciõ con el auxilio de las Ciencias, parece, condenarà por ridicula la questiõ; pues dependiendo Minerva, de Belona, y Belona de Minerva, y favoreciendose mutuamente para su conservacion, no pueden llevarse la antelacion las Ciencias sin ir acompañadas de las Armas, ni las Armas pueden cargar con la palma, ò la Corona, quedandole sin palma ò sin Corona las Ciencias.

Para escrivir Señor elle Libro que intento dar à luz, me he valido de diversas Ciencias; de la Philosophia, porque de el poco tiempo que la curse me an quedado algunos pirncipios; de la Mathematica, porque la afficion que le he tenido me ha hecho aprender alguna cosa de ella; y de la Arithmetica, sin laqual no se puede practicar la Nautica; y paraque las Armas de V. S. sellevẽ la palma entre estas Ciencias, ò paraque estas Ciencias, en quanto dàn el ser à este Libro, estẽ debajo de la protecciõ de las Armas de V. S. dedicò, y consagrò à tales Armas este trabajo, pequeño, para lo que V. S. merece, y yò le debo; grande, por razon de el sudor que me ha costado.

V. S. esta obligado de Justicia à recibir debajo de su proteccion este Libro, no por mi, si por loq̃ trata, pues es mucho lo que V. S. debe al Arte de navegar; porque sin sus auxilios mal pudieran haver pasado los nobilissimos Progenitores de V. S. ya à Flandes, ya à Italia, ya a Indias; donde añadieron mayores realzes à su nobleza, unos con las Armas [illegible]

COMMENTS BY

G. Geiver Anderson

We have here a detailed description of the important dimensions and proportions of the essential parts of a typical Manila Galleon of 1733. If we accept Diego Garcia de Palacio's instruction book of 1587, which gives the length of one codo as two feet or two-thirds of a yard, and the pulgada (or punto) as 1/24 codo would be just one inch. We are shown a vessel with these basic dimensions:

Keel	(Quilla)		62 codos	or 124 feet
Breadth	(Manga)	Fwd	21 1/6 codos	42 1/3 feet
		Mid	20 2/3	41 1/3
		Aft	19 2/3	39 1/3
Depth	(Puntal)		10 1/3	20 2/3
Tons	(Toneladas)		919	
Proportions: beam-keel-length			1 : 3 : 3.6	

Not included in the description are some desirable details: Deck camber is indicated, but no mention of sheer, which so affect a ship's appearance; lengths of forecastle, waist, quarterdeck and poop decks are not given; exact position of mizzen mast would be desirable.

The Estampa 11 engraving is a very useful illustration, attempting to show everything in one sketch. However, the shows some errors:

1. Fore topmast and main topmast carried aft of their masts, an evident error.
2. The main topmast extends below the top, another error.
3. The upper yards cross aft of their masts, surely an error.

He also has some omissions:

1. Gunports in forecastle and quarterdeck are not shown.
2. Portside anchors and cathead are omitted.
3. The chain above the bowsprit is not explained
4. Lower ends of shrouds seem to indicate the channels may be above the third tier of gumports, but unclear

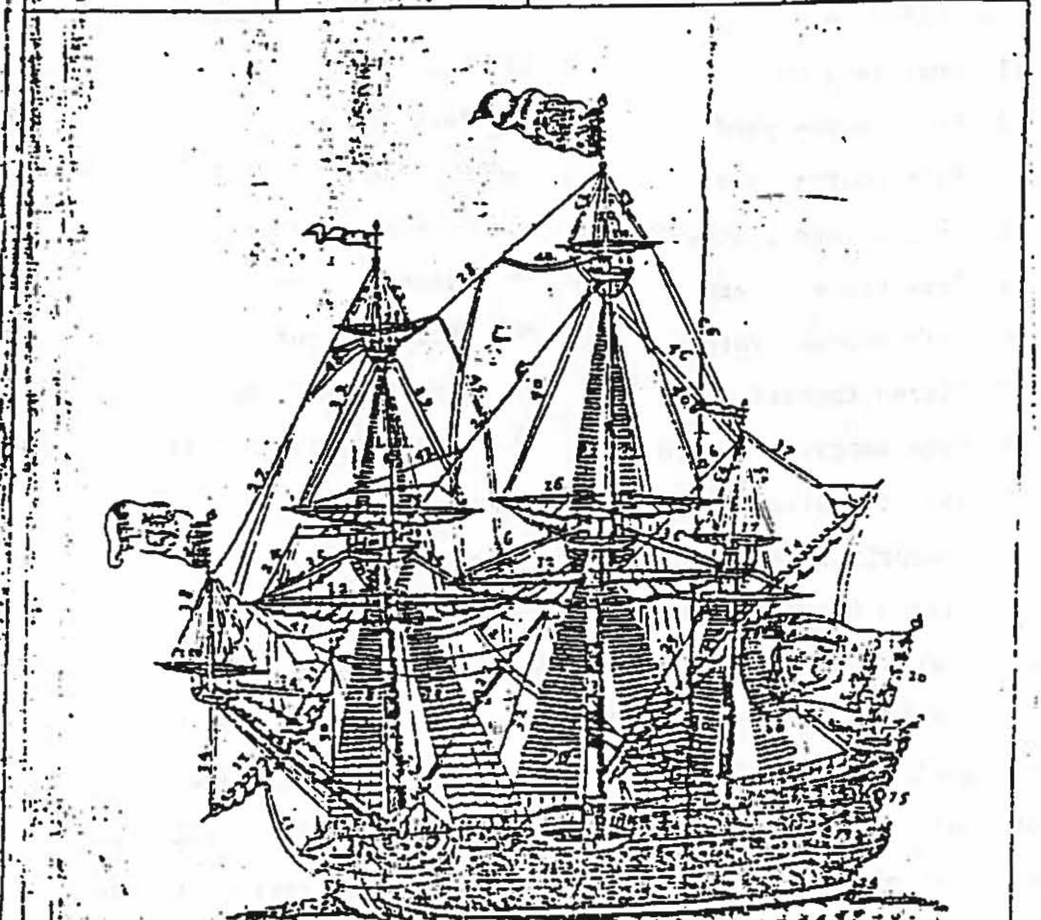
[illegible]
2 Trinquete
3 Arbol Mayor
4 Mesana
5 Masteleros de sobre Zevadera
6 Mastelero de Velacho
7 Mastelero Mayor
8 Mastelero de sobre Mesana
9 Mastelerillo de Iuanete de Proa
10 Mastelerillo de Iuanete Mayor

Vergas

11 Verga de Zevadera
12 Verga del Trinquete
13 Verga Mayor
14 Verga de Mesana
15 Verga del Velacho
16 Verga de Gavia
17 Verga de sobre Mesana
18 Verga de Iuanete de Proa
19 Verga de Iuanete Mayor
19a Verga de sobre Zevadera
19b Verga seca, o de Gata
20 Hasta de Vandera
La Quilla que se considera bajo del agua
66 La Cinta de la Manga
67 La Cinta del Combes
68 La Cinta de todo Portolo
69 Tajamar, y Vegue
70 El Castillo de Proa
71 Quadra
72 Toldillo, o Chupeta
73 Xardin
74 En donde se coloca el Iugo y tambien el Alete
75 Espejo, o Popa llana
76 La Alcazar
77 La Arrufo
Desde 65, hasta 66, el Puntal principal, y Arquear
Desde 65, hasta 68, todo el Puntal.
58 Canasta de Velacho.
59 Canasta de Gavia.
78 Obenques del Trinquete.
79 Obenques Mayores.
80 Obenques de Mesana.
81 Obenques del Mastelero de Velacho
82 Obenques de Gavia.
21 Estay del Trinquete
22 Estay Mayor
23 Estay de Mesana
24 Estay de Velacho.
25 Estay de Gavia.
26 Estay de sobre Mesana
27 Estay de Iuanete de Proa
28 Estay de Iuanete Mayor

Cauos de Labor.

29 Escota del Trinquete
30 Mura del Trinquete
31 Escota Mayor
32 Mura Mayor.
33 Escota de Mesana
34 Amantillos de Zevadera
35 Amantillos del Trinquete
36 Amantillos Mayores.
37 Amantillo de Mesana
38 Amantillos de so Zevad
39 Amantillos de Velacho
40 Amantillos de Gavia
41 Brazas del Trinquete
42 Brazas Mayores
43 Brazas del Velacho
44 Brazas de Gavia
45 Brazas de Iuanete de Proa
46 Brazas de Iuanete Mayor
47 Volinas de Velacho
48 Volinas de Iuanete de Proa
49 Volinas de Iuanete Mayor
50 Volinas de Gavia
51 Escota de Zevadera
52 Amantillos de Iuanete de Proa.
53 Amantillos de Iuanete Mayor
54 Amantillos de so Mesana
55 Escotines de Gavia
56 Escotines de Velacho
57 Gavieta de Proa.



- [illegible]

1 Bowsprit
2 Foremast
3 Mainmast
4 Mizzen (mast)
5 Bowsprit topmast
6 Fore topmast
7 Main topmast
8 Mizzen topmast
9 Fore topgallant mast
10 Main topgallant mast

- YARDS -

11 Spritsail yard
12 Fore course yard
13 Main course yard
14 Mizzen yard (Lateen yard)
15 Fore topsail yard
16 Main topsail yard
17 Mizzen topsail yard
18 Fore topgallant yard
19 Main topgallant yard
150 Bowsprit topsail yard
151 Mizzen crossjack yard
20 Stern flagstaff

- PARTS OF HULL, OR VESSEL

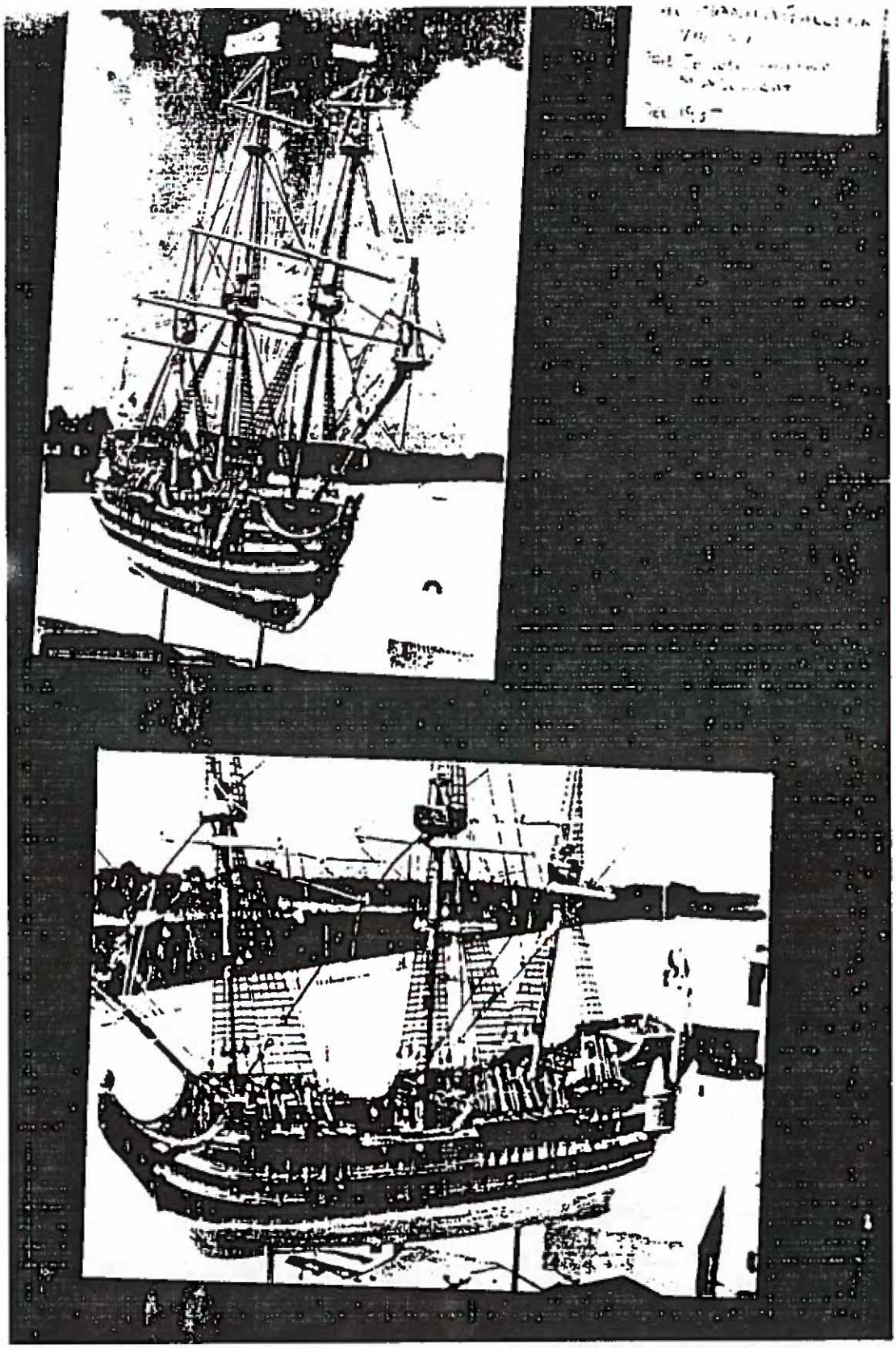
65 Keel, which is under water
66 Wale at Main breadth
67 Wale of the Waist
68 Wale of all portals (gunwale)
69 Gutwater
70 Forecastle
71 Quarter
72 Poop deck
73 Privy (stern gallery)
74 Location of transom and fashion pieces
75 Mirror or plain flat stern
76 Quarterdeck
77 Rounding of the bow
From 65 to 66 Main height for measuring
From 65 to 66 All the height for measuring
58 Fore top
59 Main top

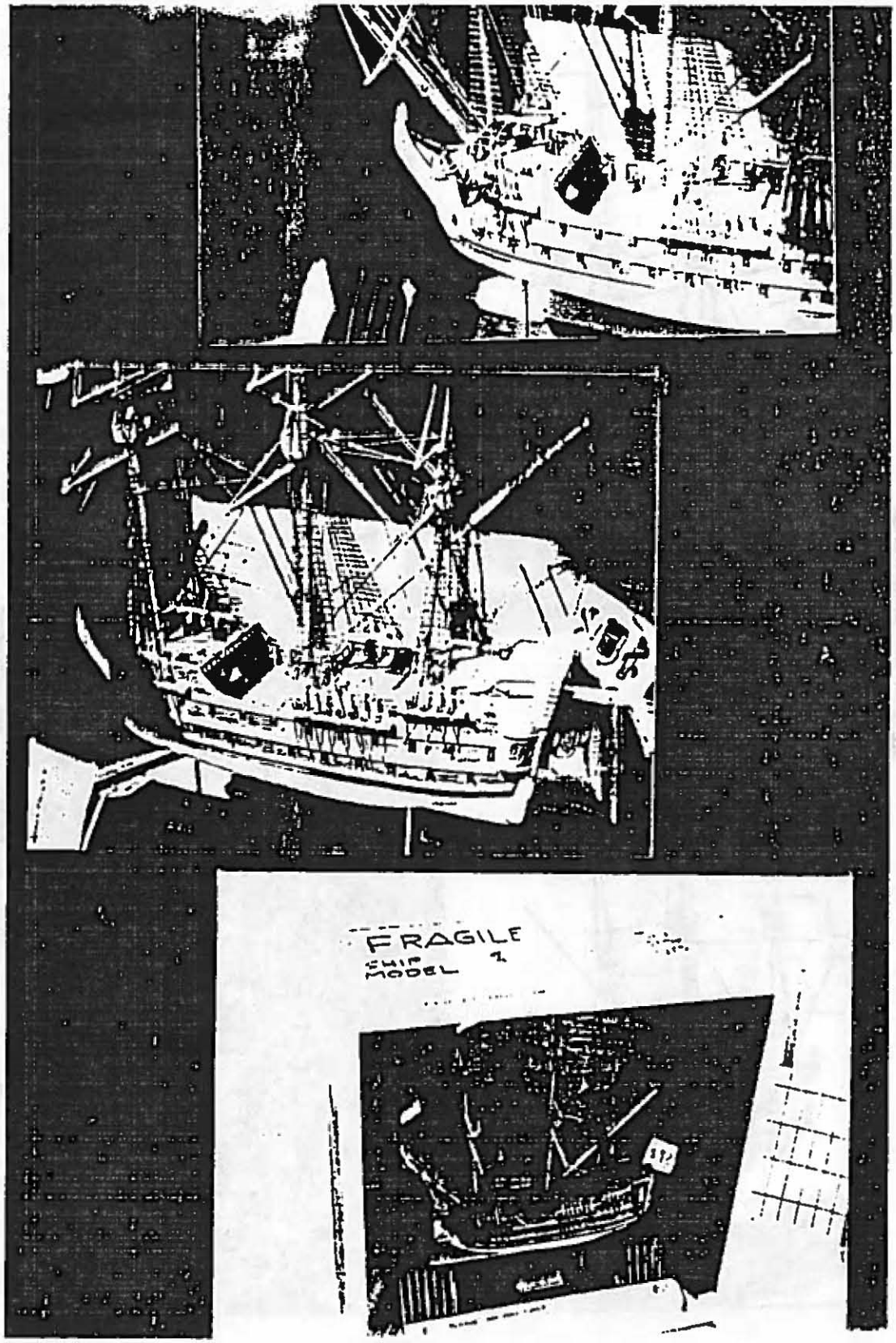
-PRINCIPAL LINES (STANDING RIGGING)

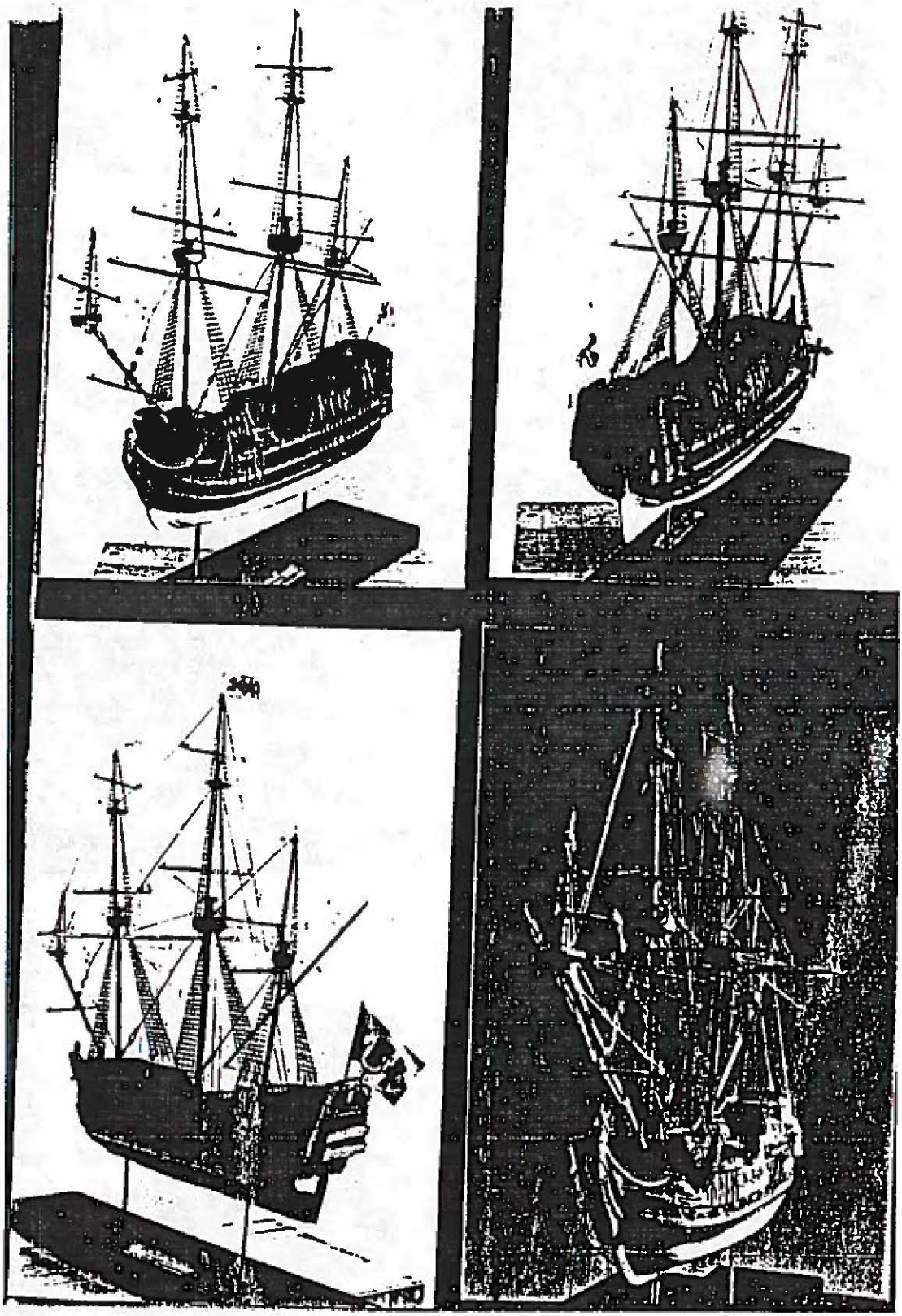
78 Foremast shrouds
79 Mainmast shrouds
80 Mizzen shrouds
81 Fore topmast shrouds
82 Main topmast shrouds
21 Foremast stay
22 Mainmast stay
23 Mizzenmast stay
24 Fore topmast stay
25 Main topmast stay
26 Mizzen topmast stay
27 Fore topgallant mast stay
28 Main topgallant mast stay

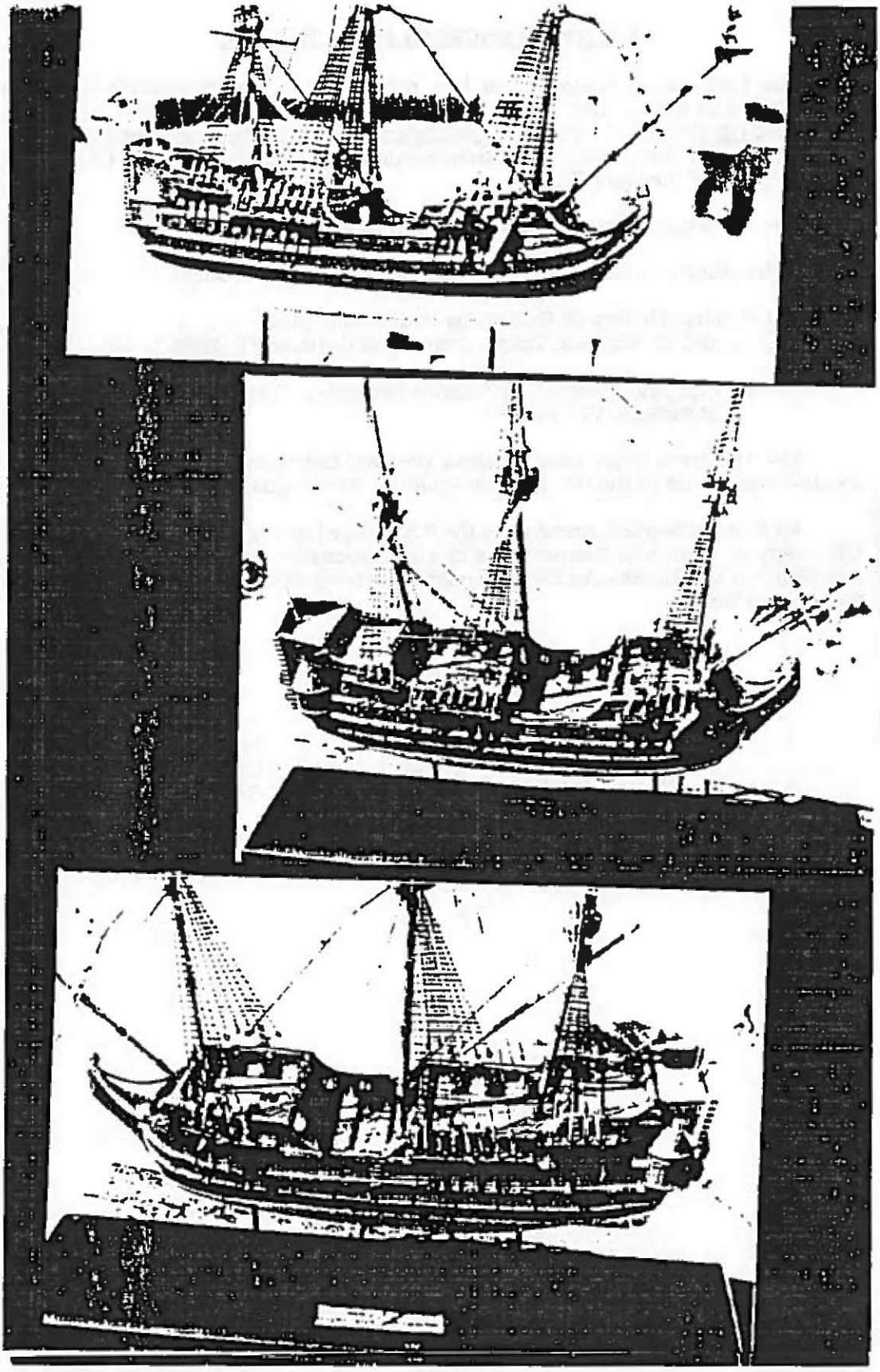
29 Foresail sheet
30 Foresail tack
31 Mainsail sheet
32 Mainsail tack
33 Mizzensail sheet
34 Spritsail lifts
35 Foresail lifts
36 Mainsail lifts
37 Mizzensail lifts
38 Spritsail topsail lifts
39 Fore topsail lifts
40 Main topsail lifts
41 Foresail braces
42 Mainsail braces
43 Fore topsail braces
44 Main topsail braces
45 Fore topgallant sail braces
46 Main topgallant sail braces
47 Bowlines - Foretopsail
48 Bowlines - Fore topgallant sail
49 Bowlines - Main topgallant sail
50 Bowlines - Main topsail
51 Spritsail sheet
52 Lifts - Fore topgallant sail
53 Lifts - Main topgallant sail
54 Lifts - Mizzen topsail
55 Main topsail sheets
56 Fore topsail sheets

Not listed:
97 Bowsprit top
98 Fore top
99 Main top
None Mizzen top




FRAGILE
SHIP
MODEL





A NOTE ON SOURCES FROM THE AGI:

The information contained in this report comes almost entirely from the translation and interpretion of original archive documents found in the ARCHIVO GENERAL DE INDIAS, Section "Escribania en Camara de Justica", Legajo # 414C. Some information was also gleaned from Section "Contratacion", Legajo # 4227 and Section "Mexico", Legajo # 58.

The following books also provided background information:

"The Manila Galleon", by William L. Schurz, New York 1939.

"A Complete History Of Guam", by Paul Carano and Pedro C. Sanchez, Tokyo, Japan and Rutland VT, 1964.

"Guam Past And Present", by Charles Beardsley, Tokyo, Japan and Rutland VT, 1964.

The US Army chart used to show the wrecksite general area and probable location was found in the US National Archives, Alexandria, VA.

Mr Bruce Chappell, Archivist at the P.K. Yonge Library of Florida History at the University of Florida in Gainsville, is chiefly responsible for the transcription and translation of the Spanish Archive documents. This report could not have been written without his help.

Philip Masters
PO Box 14668
University Station
Gainesville, FL, 32604

ARCHIVO GENERAL DE INDIAS

SECTION : ESCRIBANIA EN CAMARA

LEGAJO # 414C

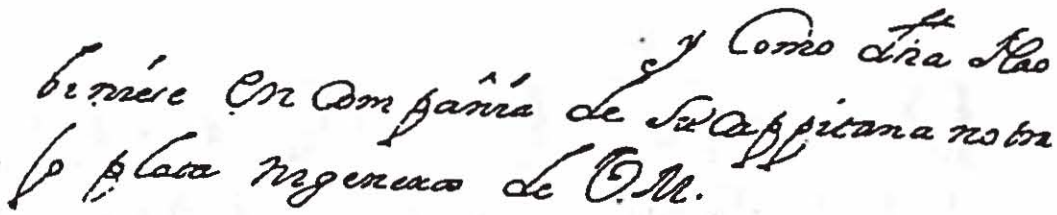
DO AVTENTICO
de la Reſidencia que dio el Almir.te
D. Iuan de chauarria de la buelta de
Viage que hizo de la Nu.a Eſp.a
à eſtas Islas, y ſe perdio en las Is
las Marianas en la Nao Alm.ta nra
S.ra del Pilar de Saragoza, y S. Tiago
y a los demas ſus Miniſ-
tros, y Offic.s

Title page of 1691 report to the Crown regarding the shipwreck of Nuestra Senora del Pilar de Saragoza y Santiago on 2 June, 1690. Includes oral and written testimony of witnesses at both June 1690 and April-May 1691 Inquiries. Also contains copies of her original outfitting, crew list, eastbound manifest, and sailing orders. Complete report totals 634 pages.

Archivo General de Indias
Section: Escribania en Camara
Legajo # 414C

Letter of 25 June, 1691,
Audiencia of Manila to the Crown.
Excerpt from Page 4vo:

Spanish Document Text:



Transcription:

".....y Como dha Nao biniese en Compania de su Capitana no trajo plata ni generos de V.M....."

Translation:

".....and as said ship (Pilar) sailed together with it's Capitana, it carried neither silver nor goods belonging to the Crown...."

Comments:

Establishes that Pilar carried no Crown silver. Thus, all silver cargo referred to in other documents was privately owned.

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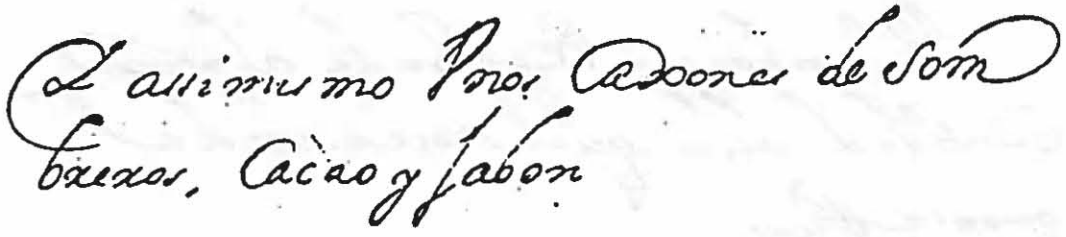
Inquiry of April-May 1691 in Manila.
Testimony of Pilar's Master.
Excerpt from folio 99vo:

Spanish Document Text:



Transcription:

"....y assi mismo Unos Caxones de Sombreros, Cacao y Jabon."

Translation:

"....and also (the Pilar carried) some cases of hats, cocoa, and soap."

Comments:

This witness, along with several others, confirms the presence of silver in Pilar's hold. This is, however, the only indication we have of the other components of her cargo.

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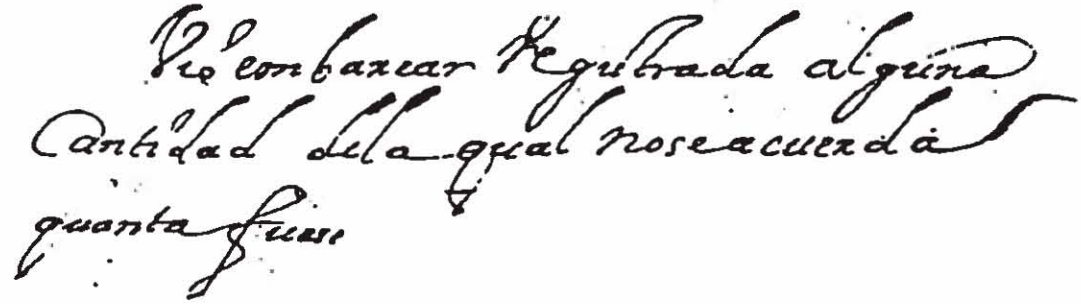
Legajo # 414C

Inquiry of April-May 1691 in Manila.
Testimony of a Pilar Officer.
Excerpt from folio 104-104vo:

Spanish Document Text:



Transcription:

"....*Vio embarcar registrada alguna cantidad de la qual no se acuerda quanta fuese....*"

Translation:

"....**that (this witness) saw loaded, in registry, a quantity of silver , but does not recall the amount....**"

Comments:

Another officer confirming a quantity of silver being loaded.

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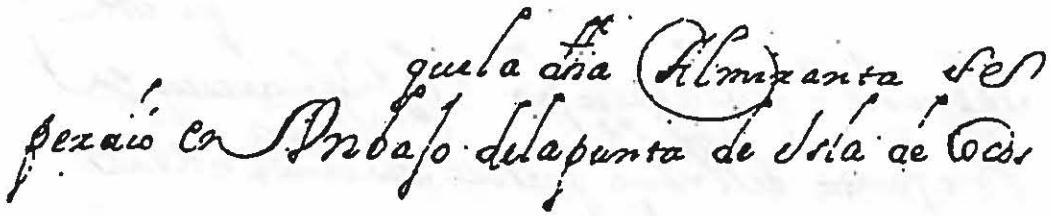
Section: Escribania en Camara
Legajo # 414C

Inquiry of April-May 1691 in Manila.
Testimony of a Pilar sailor.
Excerpt from page 53:

Spanish Document Text:



Transcription:

"....que la dha Almiranta Se perdio en Un bajo de la punta de Isla de Cocos....."

Translation:

"....that the said Almiranta was lost on a reef off the point of Cocos Island..."

Comments:

One example of the many identical statements from witnesses describing where Pilar was lost.

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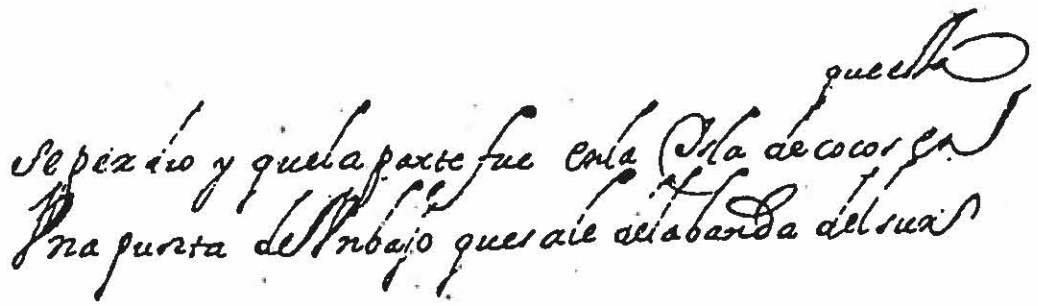
Inquiry of April-May 1691 in Manila.
Testimony of a Pilar Officer.
Excerpt from folio 102:

Spanish Document Text:



Transcription:

"....*que esta se perdio y que la parte fue en la Isla de Cocos en Una punta de Un bajo que sale de la banda del sur....*"

Translation:

"**.....that (Pilar) was lost at the Island of Cocos on a point of the reef that extends from the south side of the island** ...."

Comments:

Another description of her location.

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Section: Escribania en Camara
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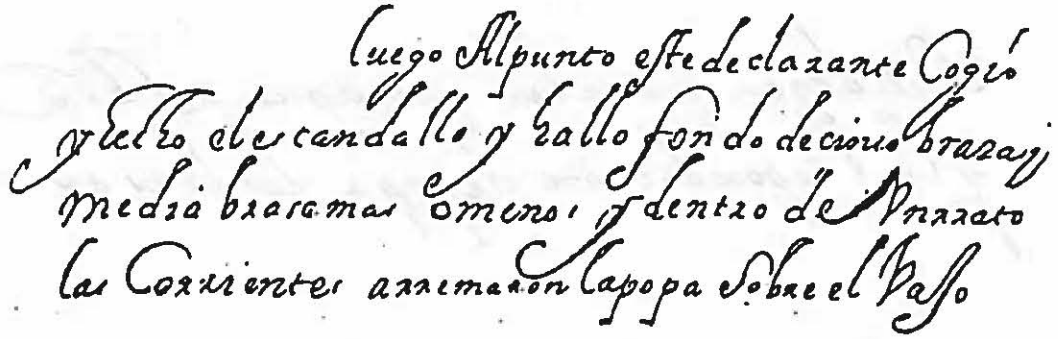
Inquiry of 5 June, 1690, aboard Santo Nino, at Guam.
Testimony of Pilar's Assistant Pilot.
Excerpt from folio 158vo:

Spanish Document Text:



Transcription:

"....luego Al punto este declarante Cogio y hecho el escandallo y hallo fonda de cinco brazas y media brasa mas o menos y dentro de un rrato la Corrientes arremaron la popa sobre el Vajo...."

Translation:

"....at that point, this declarant grabbed and threw the sounding lead and found the bottom at five and a half brasas (30 to 33 feet) more or less, and shortly the currents brought the stern onto the reef...."

Comments:

Three days after Pilar's sinking, the Assistant Pilot describes her last moments.

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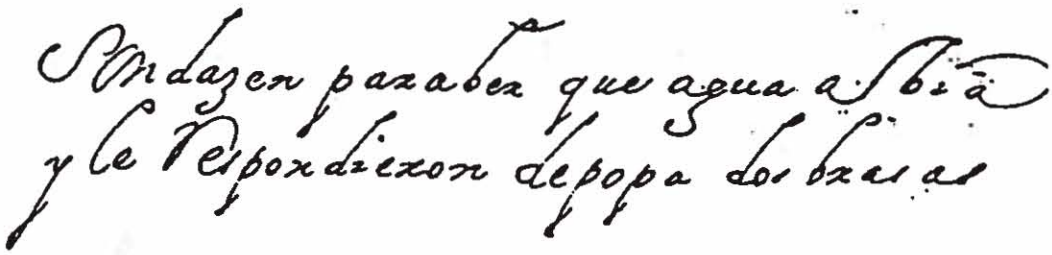
Legajo # 414C

Inquiry of April-May 1691 in Manila.
Testimony of a Pilar Officer.
Excerpt from folio 59:

Spanish Document Text:



Transcription:

"....*Sondazen para ber que agua abia y le respondieron de popa dos brasas....*"

Translation:

(After grounding, it was ordered that a) "....**sounding should be made to check the depth, and it was reported from the stern two brasas (11 to 12 feet)** ...."

Comments:

Evidence of the depth of the reef at the point where she grounded. This also helps us to estimate her keel depth.

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Inquiry of 5 June, 1690, aboard Santo Nino, at Guam.
Testimony of a Pilar Officer.
Excerpt from folio 162vo-163:

Spanish Document Text:

Transcription:

"....*iba saliendo Cossa de un cumplido de Navio dando culadas...*"

Translation:

"....**she (Pilar) came off about a ship's length, during which she bucked on the reef....**"

Comments:

Three days after it happened, an officer describes her last moments.

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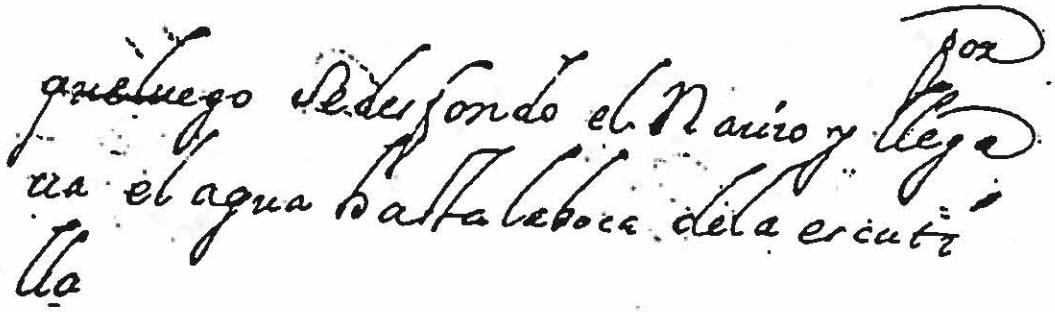
Inquiry of April-May 1691 in Manila.
Testimony of a Pilar sailor.
Excerpt from page 45vo.

Spanish Document Text:



Transcription:

"....*porque luego se desfondo el Navio y llegava el agua hasta la boca de la escutilla....*"

Translation:

"....**because after the ship lost its bottom water came in up to the mouth of the scupper....**"

Comments:

Since the "mouth of the scupper" is at the side of the upper deck, this testimony confirms that Pilar's lower decks were completely flooded after striking the reef. It was therefore considered impossible to save anything in the hold, either that night or thereafter.

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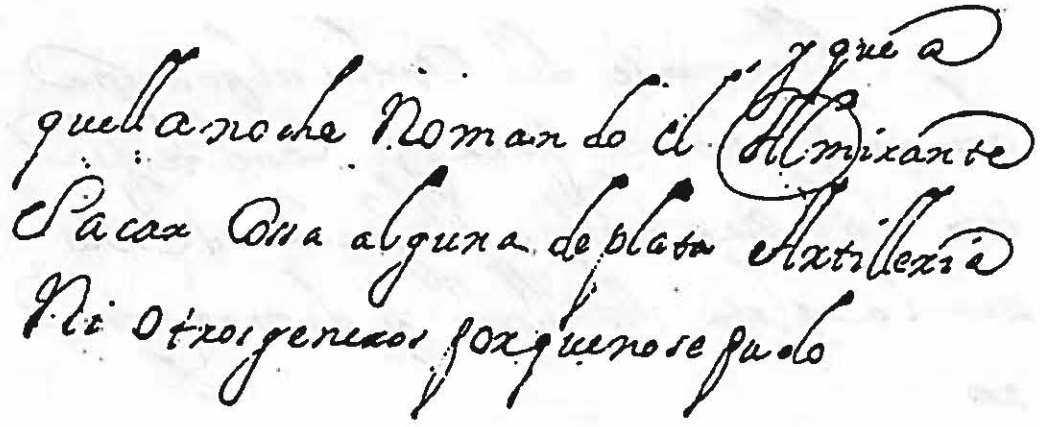
Section: Escribania en Camara
Legajo # 414C

Inquiry of April-May 1691 in Manila.
Testimony of a Pilar sailor.
Excerpt from folio 45vo:

Spanish Document Text:



Transcription:

"..... y que aquella noche no mando el Almirante Sacar Cossa alguna de plata Artilleria Ni otros generos porque no se pudo...."

Translation:

"....and that night the Admiral did not order anything taken off (Pilar) ,neither silver, artillery, nor other merchandise because it was not possible....'

Comments:

Confirmation that nothing of consequence was salvaged from Pilar the night she was wrecked.

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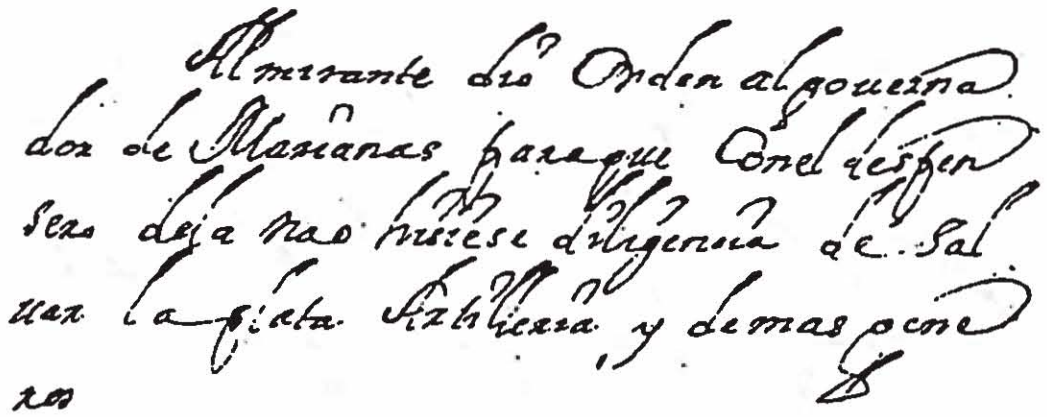
Legajo # 414C

Inquiry of April-May 1691 in Manila.
Testimony of a Pilar Officer.
Excerpt from folio 106vo:

Spanish Document Text:



Transcription:

"....Almirante dio Orden al governador de Marianas para que Con el despensero de la nao hisiese diligencia de salvar la plata Artilleria y demas generos...."

Translation:

"....the Admiral ordered the Governor of the Marianas to work with the ship's despensero to salvage the silver, artillery, and other merchandise...."

Comments:

Confirmation that the Admiral ordered recovery attempts to begin at once.

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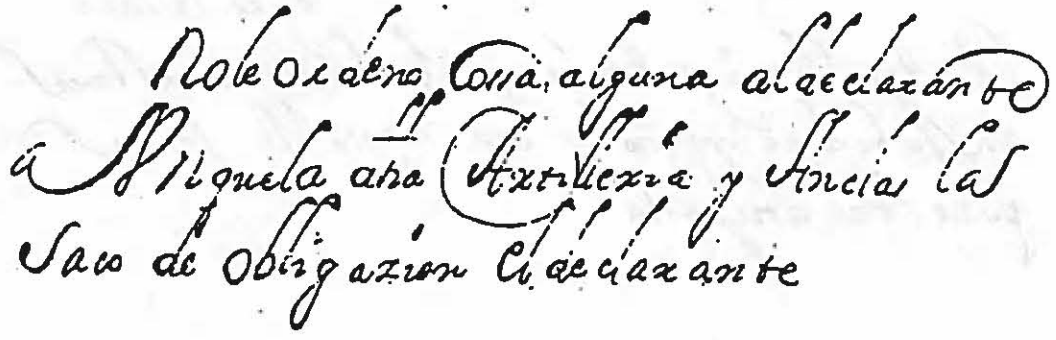
Inquiry of April-May 1691 in Manila.
Testimony of a Pilar Officer.
Excerpt from folio 59vo:

Spanish Document Text:



Transcription:

"....No le ordeno Cossa alguna al declarante aunque la dha Artilleria y Anclas la Saco de obligazion el declarante...."

Translation:

"....the declarant was given no order, although, as it was his duty, he later brought up the said artillery and anchors .... "

Comments:

This statement is in disagreement with the testimony of others regarding the orders, but confirms that Pilar's cannon and anchors were recovered a few days after her sinking .

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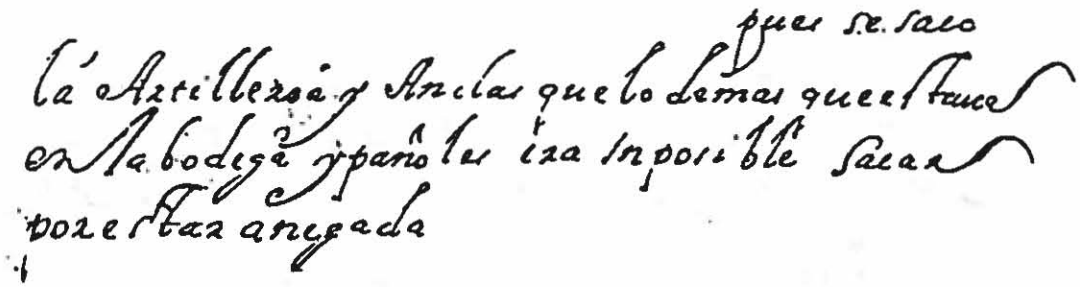
Legajo # 414C

Inquiry of April-May 1691 in Manila.
Written response of Admiral Juan de Echevarria to the charges against him.
Excerpt from folio 154:

Spanish Document Text:



Transcription:

"....pues se saco la Artilleria y Anclas que lo demas que estava en la bodega y panoles les era imposible sacar por estar anegada...."

Translation:

"....thus the artillery and anchors were brought up, but everything else in the hold and the lockers was submerged and impossible to salvage...."

Comments:

The Admiral explaining why the silver and other cargo couldn't be recovered.

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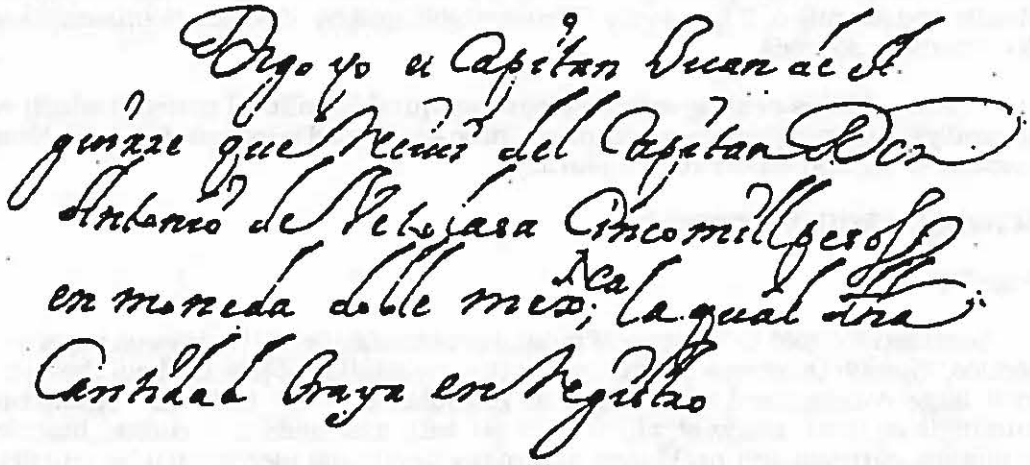
Inquiry of April-May 1691 in Manila.
Testimony of a Pilar Officer.
Excerpt from folio 117:

Spanish Document Text:



Transcription:

"Digo yo el Capitan Juan de Aguirre que recevi del Capitan Don Antonio de Vetolasa Cinco mill pesos en moneda doble mexCA la qual dha Cantidad traya en registro....

Translation:

"I, Captain Juan de Aguirre, received from Captain Don Antonio de Vetolasa five thousand pesos in Mexican silver money, which amount was brought in registry (by the Pilar)...."

Comments:

Testimony by the owner of the only silver recovered. "Moneda doble mexCA" refers to Mexican silver coins of four and eight real denominations.

SOURCE QUOTES OF GALLEON CARGOES

"THE MANILA GALLEON" by William Lytle Schurz
E.P. Dutton & Co.
New York 1939

This book is recognised as one of the few reliable and very definitive works on the Manila Galleon trade. Its author, William L. Schurz, began his research work in 1912 and spent more than 27 years investigating the documentation of the trade stored in Archives in the Philippines, Spain, Mexico, Europe and the USA. It provides the basic reference of the history, trading patterns, regulation , conditions, corrupt practices and modus operandi of the 250 year service of Royal Galleons between Manila and Acapulco. It has a very extensive bibliography of books, manuscripts and documentary sources.

Some quotes dealing with precious and durable cultural material which was generally found in galleon cargoes follow. These are divided into material on the Manila - Acapulco leg and on the return journey.

ACAPULCO-BOUND VESSELS

Page 34

" ... considerable gold in the form of bullion or manufactured articles was exported to Mexico. Though there was a legal ban on the importation of jewelry from the Orient, in a large consignment confiscated at Acapulco in 1767 there are enumerated hundreds of rings, many of which were set with diamonds and rubies, bracelets, pendants, earrings and necklaces, and many devotional pieces such as crucifixes, reliquaries, and rosaries, and including a cross set with eight brilliants. There was also seized on the same occasion a "golden bird from China", some jewel studded sword hilts and several alligator teeth capped with gold. Many uncut and unset gems were also carried to Mexico.."

Page 35

"... There was always .. sticks of ivory .. ivory castanets and bric a brac of ivory, jade and jasper... fruit dishes of gold and silver... huge earthen jars (tibores) and porcelain wares of great variety...."

MANILA-BOUND VESSELS

Page 155

"... According to the Council of the Indies in 1772, the galleons always returned to Manila from two to three million pesos...."

"...The Council declared in 1764 that 2,000,000 pesos were regularly embarked at Acapulco over the Permiso. Ten percent of this excess, they charge, was divided among the officials at Acapulco and the Viceroy...."

Page 156

"... The most lucrative period was the early decades of the line, before attempts at restriction had unsettled the steady course of trade, or the effects of Dutch and English competition became evident..."

"... Governor Anda said that from 1,500,000 to 2,000,000 pesos were taken each year from Mexico to Manila...."

"... The fiscal at Manila declared in 1688 that the galleons generally returned at least 2,000,000 pesos..."

"THE TREASURE DIVER'S GUIDE" by John S. Potter.
Hale & Co
New York 1973

Potter's book is a very well researched study of valuable ship losses through the world. He spend many years researching the subject in Archives around the world and his book is regarded as one of the most authoritative sources on the matter.

Page 445

" .... Any doubts over the astonishing wealth carried in these Manila galleons can be referred to the salvage from a patache which broke up on the reefs of Calantas in the Philippines in 1735. Though scarcely one-fifth the tonnage of the huge galleons, this little ship yielded 1,518,000 pesos - 768,000 official and 750,000 private - to salvors before work was finally discontinued, with still more silver below. The 200 ton ship must have been ballasted with coins, for she carried nearly 50 tons of them ... "

APPENDIX G - CHAMORRO HISTORICAL OVERVIEW (600 BC TO 1700 AD).

(After Russell, Fleming and Guerro, 1990)

The Agana area has been occupied for at least 2,000 years. A great majority of this occupation consisted of traditional Chamorro settlements in prehistoric times. Following contact with the West, Agana evolved through several distinctive historic periods. This included the Initial Spanish Settlement Period (1668 to 1700); Later Spanish Period (1700 to 1898); Prewar U.S. Naval Government Period (1898 to 1941); Japanese Occupation Period (1941 to 1944); and the U.S. Reoccupation Period (1944 to 1945). Although only two of these periods are discussed in detail in this Report, some general landuse patterns have been identified and are presented here.

PREHISTORIC PERIOD (600 B.C. TO 1668 A.D.).

These settlements were situated along the coast and relied on marine and terrestrial resources that were available nearby. A prominent feature of prehistoric Agana was a large embayment which later sealed off from the ocean to become a swamp. Initial settlement in the Agana area was inland of the modern coastline along the cliffs at the base of Agana Heights. Although the earliest settlement pattern in Agana is unknown, by the time of European contact, Agana possessed a latte village of approximately 150 houses and 1000 people and was reported to be one of the most powerful polities on the island. No detailed description of prehistoric Agana was recorded. If the coastal latte settlement patterns from other coastal villages on Guam can be looked to as a general model, Agana in the mid-seventeenth century probably consisted of a linear arrangement of residential houses with associated cooking areas and nearby gardens. Landownership in later prehistoric times was probably matrilineal and similar to landownership systems that existed in other areas of Micronesia. It is very likely that society was divided into two classes - one consisting of the chiefly class and the second a commoner class - with minimal social differentiation between them. There is some indication that coastal villages may have enjoyed a higher status than inland villages.

ESTABLISHMENT OF HISTORIC AGANA (1668 - 1700).

Following the arrival of the Spanish Jesuits under the command of San Vitores in 1668, Agana underwent major changes. During the first few years, the traditional Chamorro settlement in the area remained unchanged with only a few modest European buildings - a church and storehouse - being constructed. Later, a stockade and fort were completed. However, the activities of the Spanish mission were to change major landuse patterns carried over from the prehistoric period. Within five years after the arrival of the Spanish, major armed resistance to the mission had commenced. Spanish military raids caused many traditional Chamorro settlements to be abandoned with their residents moving to the Agana area to avoid further retaliatory raids. Agana, as the seat of the mission, soon became the island's most important settlement and the seat of religious and governmental power. By the end of this period, Agana had been transformed into Micronesia's first colonial settlement, complete with Spanish settlement patterns including the barrios of San Ignacio, Santa Cruz and San Nicolas, a plaza and a Catholic Church. Agana, at least during the first 30 years or so, was almost exclusively a Spanish settlement. Chamorros were not permitted to reside within Agana itself but had to content themselves with living in adjacent areas where they were close enough to attend daily mass. By the end of this period, traditional Chamorro settlement patterns and the land ownership system were replaced by European models.

By the 1690s, Agana was primarily a foreign city with a population of only 300. The city proper encompassed two barrios - San Ignacio and San Nichols - which lay between the plaza and the seashore. Chamorros did not live in Agana during this

period but rather in adjacent barrios such as Anigua, Sinahana and Apurguan. They were close enough, however, to attend church in Agana. By the end of the century, the first palace (palacio) was constructed in the southwest corner of the present day Plaza de Espana, and Agana began to take on the characteristics of a Spanish colonial city.

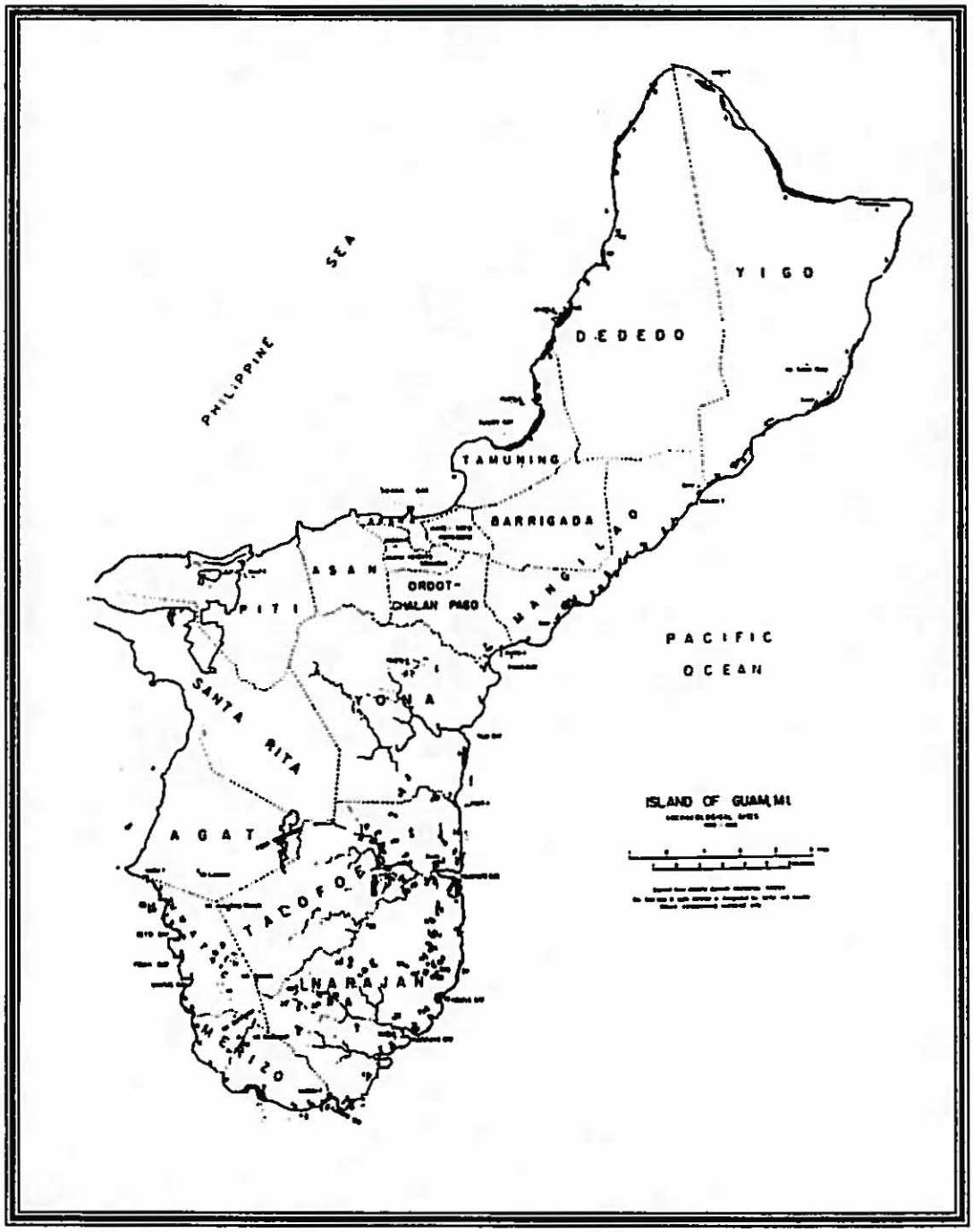
A table showing the populations figures for Guam and Agana during this period follows:

Population Figures for Guam and Agana
1668 to 1693

YEAR	GUAM	AGANA	SOURCE
1668	30,000	1,000	
1690	1,800	300	Repetti (1962)
1693	1,593	449	Repetti (1940)

A map showing archaeological sites on Guam is shown on page G-3 (After Reinman, 1977).

ARCHAEOLOGICAL SITES MARKED ON A MODERN MAP OF GUAM



APPENDIX H - EARLY SPANISH MISSIONS ON GUAM : FUUNA, MERIZO AND UMATAC.

(After Haynes and Wuerch, 1990)

For those missions for which evidence exists on which buildings were built in what order, a pattern emerges. First, the church would be built. No detailed description of the first wooden churches exists, but an examination of the Umatac ruins may offer us some clues as to their architectural design. The typical early wooden church probably was very simple in design, with one nave, two flanking aisles, and one apse. A few were larger, with several naves. The roofs of these wooden buildings were all made from palm thatch. For the stone churches, we have evidence from the Umatac ruins, which researchers examined, and from the Malaspina and Freycinet engravings. The print from the Malaspina expedition is much truer to life than that from the Freycinet expedition, when one compares the prints to the ruins today. The size and height of the Umatac church is greatly exaggerated in the latter print. That fact, coupled with the omission of such obvious details as the massive, prominent buttresses, the Arago print from the Freycinet expedition should not be taken to be the actual appearance of these early stone (mamposteria) churches. The roofs of these stone churches were either palm-thatched or tiled.

Next, a house for the priests would be built, separated from the church, which probably also served as the sacristy. No detailed description of them exists, but one can assume they were simple, wooden, one-room, rectangular structures with palm-thatch roofs.

Then, one or two schools would be built as part of the mission complex, structures that probably resembled the simple buildings that served as the priest's houses. Finally, if the mission was in existence for long enough, additional structures such as storehouses would be added.

FUUNA

This mission consisted of a house and church built of wood which was constructed in 1672 near present day Fort Soledad in Umatac, the church being dedicated to San Jose. It was destroyed in the November, 20, 1693 typhoon and rebuilt the following year. It was in use until sometime between 1702 and 1715. There is no evidence that it was ever in use after this date or that stone buildings were ever on this site.

MERIZO

This was the fifth mission established on Guam. A wooden church and house were built in January 1672. The church was dedicated to Saint Dimas. The mission was destroyed in the 1693 typhoon and soon rebuilt. The mission was is use through the early 1700's. Construction of a stone church with palm thatch was completed in 1779. The first priest in the new church was Padre Antonio. The father's name as well as that of the King of Spain, Charles III, was engraved on a stone in the church. In 1819 a keen observer noticed no trace of this church. It must have been rebuilt after that date since the Merizo church was recorded to have been destroyed by fire in 1858. The priest's house was still in existence in 1865.

UMATAC

Construction of the mission was begun in 1680 and was completed in February 1681. The church was dedicated to Saint Anthony. The buildings were of wood with palm thatch roofs. They were destroyed in 1684 during a Chamorro rebellion and rebuilt by 1689. The mission was again destroyed in 1693, this time by the typhoon

of November 20 of that year and rebuilt by August 16, 1694. It was the first church on the island to be rebuilt following the typhoon.

This mission was in continuous use after this date. By 1769 the wooden structures had been replaced by stone buildings, however, they still had palm thatch roofs. The mission was depicted as it looked in 1792 by members of the Malaspina expedition. The buildings were still standing and in use in 1819, and by that time a convent had been added, although the convent was being used as a hospital. The buildings are shown on a map of the town in 1819, and engravings of the church and convent were made the same year. The mission was eventually destroyed by the earthquake of February, 25, 1849. Standing archaeological remains of the stone church are still clearly visible today in Umatac. An illustration of the church during the Spanish period is on page H-5.

CONCLUSION.

Our study shows three distinct periods of construction for Spanish missions on Guam up to 1800. The first period was during the founding of the first missions from 1668 to 1675, after which virtually all the missions were destroyed or damaged during the Chamorro rebellions. In this first period of construction, all the buildings were wooden with palm-thatched roofs, except for the Agana stone church completed in 1677. The chronological order of the building of these first missions is as follows: Agana (1669); Nisihan, Pigpug, Pagat, Merizo, and Fuuna, all in 1672; Tepungan, Orote, and Taragüe, all in 1674; and Ayraan and Ritidian, both in 1675.

The next period of construction was in 1680 and 1681. The lack of construction between 1675 and 1680 was presumably due to the Chamorro uprisings of that time. The missions built in this second period of construction were all wooden, with palm-thatched roofs. Agat, Inarajan, and Pago were built in 1680, and Inapsan, Mapupan, and Umatac were built in 1681. A map of Guam published in 1700, but drawn earlier, shows mission sites at Tarrague, Inapsan, Aryaan, Orote, Merizo, Nisihan, Mapupun, Pagat, Agana, and Umatac. A copy of this is on page H-3.

Our search shows that the above villages were the only ones to have missions. Various primary sources mention the number of missions in existence on Guam between 1682 and 1686 without specifying their locations. These sources are from 1682, 1684, 1685 and 1686. The 1682 and 1684 sources mention seven missions in existence, the 1685 source mentions nine, and the 1686 source mentions twelve. So some of the missions mentioned above were rebuilt or repaired after being destroyed or damaged in the Chamorro rebellions of the late 1670's and early 1680's, in addition to the ones at Agana, Inapsan, Umatac, Pago, Agat, and Inarajan.

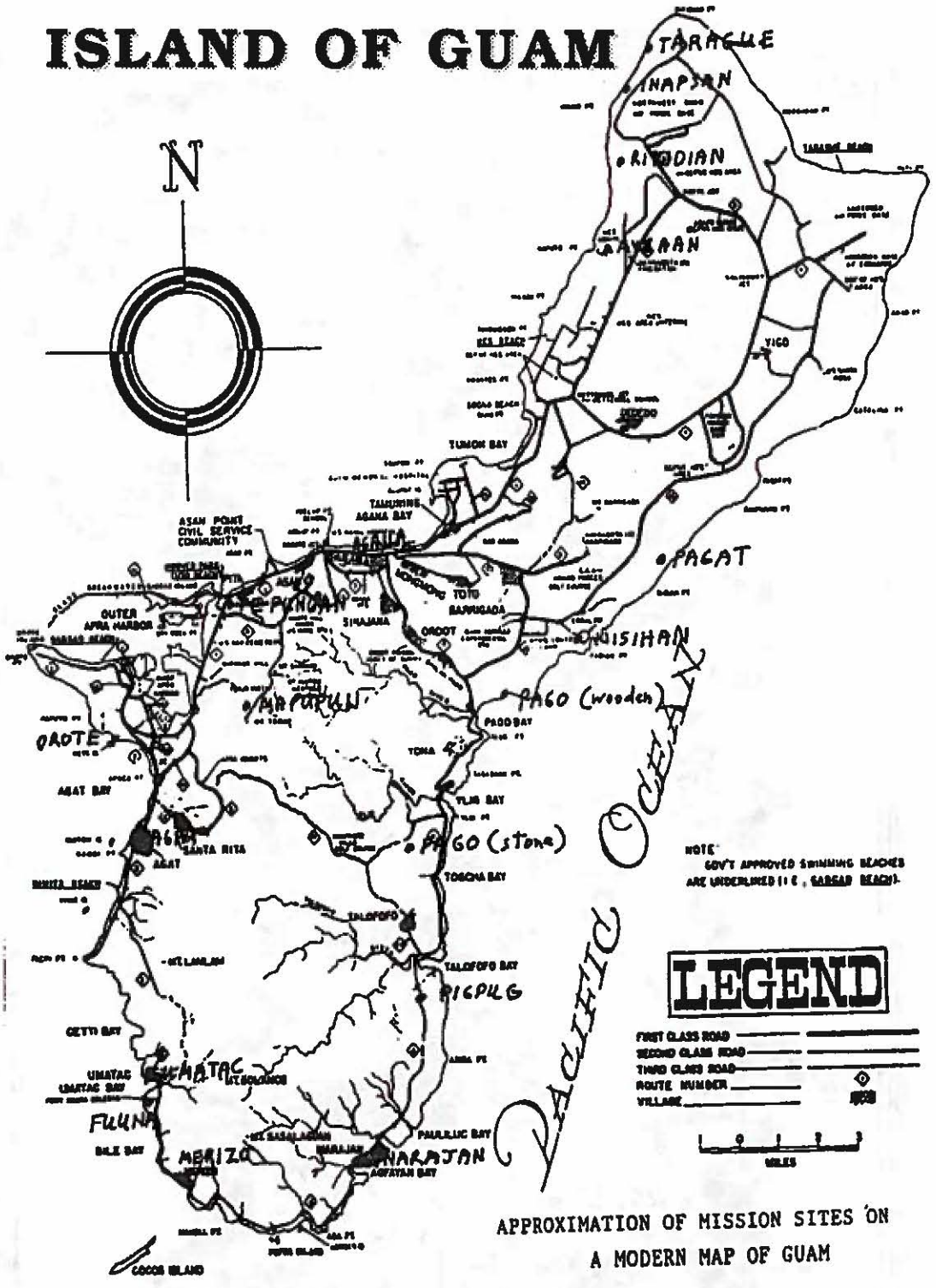
Nevertheless, by 1680 some consolidation of the missions took place, since only Agat, Agana, Umatac, Fuuna, Merizo, Pago, and Inarajan are mentioned.

By 1758, the population of Guam had concentrated in two villages, Agana and Umatac, and only these missions were in active use, although some of the other missions buildings were still standing, as is mentioned above in the site histories.

The final period of construction in the eighteenth century was in 1769-1779, when stone buildings were built at Agat, Inarajan, Merizo, Pago, and Umatac. The rest of the eighteenth century, soon after the expulsion of the Jesuits in 1769, was a period of consolidation and decline for the Spanish missions on Guam. By 1819, only four were in active use, Agana, Pago, Agat, and Umatac. Finally, by 1848, only two were in active use, in Agana and Agat.

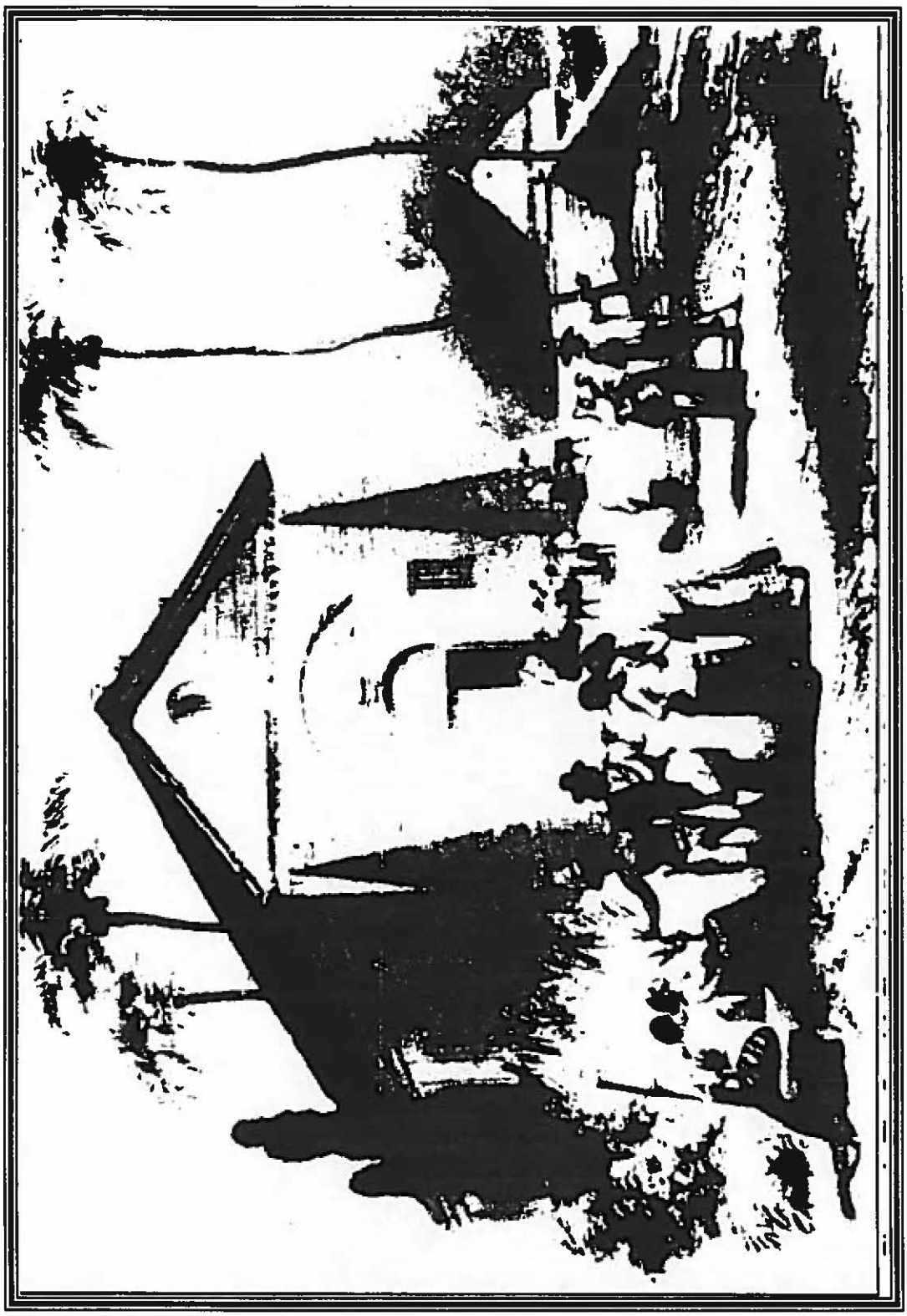
A modern map of Guam ,with the missions marked on it, is on page H-4.

HISTORICAL MAP OF GUAM SHOWING MISSION SITES



APPROXIMATION OF MISSION SITES ON
A MODERN MAP OF GUAM

THE SPANISH CHURCH IN UMATAC (HEZEL, 1989)



APPENDIX I - PILAR PROJECT BIBLIOGRAPHY.

Pilar Project Ltd.

(1) Monthly Reports to GovGuam, Department of Parks and Recreation - February , March, April/May, June, July, 1991.

(2) Pilar Project Progress Report at "New Insights Into Ancient Guam", Depart -ment of Parks and Recreation, Historic Preservation Month 19 July 1991.

(3) Third Global Congress of Heritage Interpretation International : Joining Hands for Quality Tourism, "Marine Archaeology and Cultural Tourism in Guam : A case study in the development of a government private sector partnership." Honolulu, Hawaii, 3-8 Nov. 1991 (forthcoming).

(4) "*Ballast Analysis on the Pilar Site : A Methodological Study.*" Manuscript on file.

APPENDIX J - UNIVERSITY OF GUAM LETTER OF SUPPORT.

UNIVERSITY OF GUAM
UNIBETSEDÅT GUAHAN
MICRONESIAN AREA RESEARCH CENTER

University of Guam
UOG Station, Mangilao, Guam 96923
Tel: (671) 734-4473
Fax: (671) 734-7403

August 6, 1991

Mr. R. Duncan Mathewson III
Director of Archaeology
The Pilar Project, Ltd.
P.O. Box 1649
Agana, Guam 96910
FAX 477-3682

Dear Duncan:

I would like to take this opportunity to reaffirm our interests in continuing the fine working relationship established some months ago through you and Mr. John Bent of the Pilar Project, Ltd.

As you know, we are looking forward to working with you in the areas of continuing education, student internships, and classes in "Marine Archaeology", "Spanish Maritime Culture in the Pacific" and "Laboratory Techniques", during which our students will obtain hands-on experience working with your Project personnel.

We also anticipate assisting you, whenever our time permits, in the historical research on the Pilar and any possible effect the shipwreck may have had on the native Chamorro culture.

One of the things we would like to consider is working closely on developing K-12 teaching materials which will focus upon the understanding of the Spanish and Chamorro culture in the Pacific. Another thing we hope to do is working together to develop interpretive museum exhibits which will highlight the findings of our joint effort.

In closing, I wish you all my best for your pioneering efforts in creating a Marine Archaeology program on Guam.

Sincerely,

Hiro Kurashina, Ph.D.
Archaeologist

APPENDIX K - PERMIT AGREEMENT WITH GUAM GOVERNMENT.

AGREEMENT

This Agreement is made this _____ day of July, 1987, by and between the Government of Guam, acting through the Department of Parks and Recreation, hereinafter referred to as the "GOVERNMENT", and Davey Jones Archaeology, a Guam corporation, hereinafter referred to as the "SALVOR".

WITNESSETH

WHEREAS, the SALVOR has made application to the GOVERNMENT under Government Code section 13985.34 to conduct survey and recovery operations relating to underwater historic property; and

WHEREAS, the GOVERNMENT has determined that the SALVOR is a qualified applicant; and

WHEREAS, the GOVERNMENT has determined that it would be in the best interests of the territory of Guam to grant SALVOR a permit, pursuant to Government Code section 13985.34, to conduct survey and recovery operations relating to underwater historic property; and

WHEREAS, the permit, subsequently modified, was issued to the SALVOR on May 5, 1987, with the condition, noted in Section 6 of said permit, that a more detailed agreement was to be negotiated between the parties within ninety (90) days of the issuance of the permit;

Agreement for Salvage

NOW, THEREFORE, the GOVERNMENT and the SALVOR in consideration of the mutual covenants hereinafter set forth, and in accordance with Section 6 of the permit, agree and contract as follows:

1. EXPLORATION

1.1. Scope of Exploration. This Agreement covers the survey and recovery of artifacts associated with the remains tentatively identified as being those of the Nuestra Senora del Pilar. No permission is granted to the SALVOR to remove, displace or to disturb any artifacts or remains not associated with the Nuestra Senora del Pilar.

1.2. Area of Exploration. Survey and recovery operations of the SALVOR under this Agreement shall be limited to the area designated in Attachment A.

1.3. Authorization. Survey and recovery operations may commence effective with the signing of this Agreement by all parties.

1.4. Protection. Once the SALVOR has located the remains of the Nuestra Senora del Pilar, the SALVOR assumes the obligation to protect the same from third parties.

1.5. Exclusive Right. The GOVERNMENT shall not issue a permit to any other party for survey and recovery operations within the designated area set forth in Attachment A during the term of this Agreement.

Agreement for Salvage

2. PROFESSIONAL PROCEDURES

2.1 Hiring of Archaeologist. The SALVOR shall recruit and employ an experienced marine archaeologist to oversee the survey and recovery operations covered by this Agreement.

a. The SALVOR and the GOVERNMENT must both concur that the Archaeologist has sufficient professional experience and qualifications to adequately oversee the survey and recovery operations covered by this Agreement. At this time, the GOVERNMENT concurs that Ronald Coleman, Curator of the Queensland Museum, has sufficient professional experience and qualifications, subject to review of professional reports from prior projects directed by Mr. Coleman.

b. The Archaeologist shall advise the GOVERNMENT of the progress of the survey and recovery operations and the status of all research and shall work closely with the Department of Parks and Recreation's historic preservation section

c. The GOVERNMENT designates the Territorial Archaeologist to work closely with the Archaeologist and to monitor the conduct of survey and recovery operations and all research pursuant to the terms of this Agreement.

d. The Archaeologist will have the authority to direct the survey and recovery operations in accordance with the terms of a professional research design that

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applies the techniques and standards of marine archaeology to the circumstances of this project.

2.2. Survey Research Design. Prior to the use of any potentially destructive survey techniques, the Archaeologist shall complete a survey research design which will specify the measures to be employed to locate the site, its extent, the distribution of materials within the site and any other circumstances of the site as may be required for a full archaeological assessment. The survey research design shall incorporate such relevant archival materials or other information as relevant and which may be in the possession of either the SALVOR or the GOVERNMENT.

a. The survey research design must be approved by the GOVERNMENT. The GOVERNMENT may, at its discretion, circulate the proposed research design to other qualified archaeologists for their review and comment on its professional quality and adequacy. If there is a fee charged for such professional review, the SALVOR will be responsible for the fees of no more than three (3) such reviews.

b. Upon completion and approval of the survey research design, the SALVOR shall provide an estimate of the expense of completing the operations in the research design for approval by the GOVERNMENT, and the SALVOR shall post a performance bond for the amount of the estimated expense. In the event that the SALVOR fails

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to comply with the terms of the survey research design, the performance bond shall be forfeited in the amount necessary to complete the project from the point at which the forfeiture occurred.

c. The survey operations must adhere to the terms of the approved survey research design. Any additions or changes in the survey operations shall require advance notification and justification to the GOVERNMENT, and the approval of the GOVERNMENT.

2.3. SALVOR's Report. After the survey operations are completed, the SALVOR shall deliver to the GOVERNMENT a report assessing the location of the site, the boundaries of the site, the distribution of materials within the site, the depths of any deposits within the site, and any other circumstances of the site as necessary for a full and professional description and assessment of the site. The GOVERNMENT agrees to take no action with respect to nomination of the site of the Nuestra Senora del Pilar to the Guam or National Register of Historic Places which would cause a delay in the orderly conduct of the survey and recovery operations as specified in this Agreement.

2.4. Data Recovery Plan. After the completion of the survey documentation of the site, the Archaeologist shall complete a data recovery plan for the site following the principles given by the Advisory Council on Historic Preservation in Treatment of Archaeological Sites: A

Agreement for Salvage

Handbook. The data recovery plan shall specify research questions applicable to the site and its areas of significance, the potential data that address these research questions and the procedures to be applied which should yield data of relevance to the research questions concerning the specific circumstances of the site.

a. This data recovery plan may be circulated to other professional archaeologists for review of its professional scope and adequacy at the discretion of the GOVERNMENT. The SALVOR shall be responsible for the fees of no more than three such reviews of this plan.

b. Upon completion and approval of the data recovery plan, the SALVOR shall provide an estimate of the expense of completing the operations in the data recovery plan for approval by the GOVERNMENT, and the SALVOR shall post a performance bond for the amount of the estimated expense. In the event that the SALVOR is unable to complete the terms of the data recovery plan, the performance bond shall be forfeited in the amount necessary to complete the project from the point at which the forfeiture occurred.

c. No recovery operations shall take place until the GOVERNMENT has approved the data recovery plan, and the recovery operations must conform to the terms of that plan. No additions or changes in the recovery operations shall be made without first receiving the GOVERNMENT'S approval in writing.

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d. If the conduct of recovery ~~operations~~ reveal circumstances, features or artifacts not anticipated or not provided for in the data recovery plan, the SALVOR and the Archaeologist are to notify the GOVERNMENT immediately for a joint determination of whether the recovery operations currently in the data recovery plan are sufficient, or whether modifications to the plan are needed to respond adequately to the unanticipated circumstances.

e. The Archaeologist shall oversee the completion of the relevant analyses as specified in the data recovery plan, and shall compile a final report of the archaeological investigations at the site. This report shall meet standards generally recognized in the profession, such as those contained in The Management of Archaeological Resources: The Airlie House Report, edited by C.R. McGimsey III and H.A. Davis.

f. The final report and all original field notes, photographs, drawings, maps or other records of the excavation and of the site shall be the property of the GOVERNMENT, but the SALVOR and the Archaeologist shall be able to keep copies of all of the records and to use them in publications elsewhere.

2.5. Conservator. The SALVOR shall provide, in advance, sufficient funds to the GOVERNMENT for recruitment and employment of an experienced conservator of marine

Agreement for Salvage

GOVERNMENT before the conservation process commences. The SALVOR takes no responsibility for losses incurred during the conservation process other than accounting for the loss on the inventory furnished the GOVERNMENT prior to the division under Section 4 of this Agreement. Every effort shall be made by the Conservator to preserve the scientific integrity of all artifacts.

c. The SALVOR agrees to comply with the directives of the Conservator concerning the proper care and treatment of all artifacts.

d. The Conservator upon request shall, within reason, use the SALVOR's facilities to restore or stabilize artifacts within the collections of government of Guam agencies. The Conservator also shall endeavor to provide training for government of Guam employees responsible for the care of artifact collections.

3. MONITORING

3.1. Inspection of Site. The GOVERNMENT reserves the right to inspect at its discretion the area covered by this Agreement, the site of the proposed operations and to use whatever method of inspection it deems appropriate to verify information concerning the site and the performance of the SALVOR. The GOVERNMENT agrees to make a good faith effort not to disrupt the conduct of operations by the SALVOR in the absence of evidence that a violation of this Agreement has occurred.

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artifacts. The Conservator shall have the authority to oversee all operations relating to stabilization, treatment and curation of artifacts recovered by survey and recovery operations. No recovery shall take place until the facilities for treatment and conservation of artifacts is completed, and the Conservator has assumed his or her responsibilities.

a. The Conservator shall keep complete records of each artifact and its treatment. These records shall be delivered to the GOVERNMENT at least quarterly for the duration of the project, and the records may be circulated to other qualified professional conservators for evaluation and comment at the discretion of the GOVERNMENT.

b. The Conservator shall determine which artifacts are in a sufficient state of stabilization to be presented for division pursuant to Section 4 of this Agreement. No cosmetic restoration will be undertaken by the Conservator unless it is determined by the Conservator to be essential to the survival or integrity of the artifact or unless it is requested by the Archaeologist to facilitate study. The GOVERNMENT understands that on occasion severely deteriorated artifacts may not survive the conservation process. In most cases, the Conservator will recognize this possibility and bring the matter to the attention of the

Agreement for Salvage

a. Upon 24 hours advance notice given by the GOVERNMENT, the SALVOR shall be required to transport no more than two representatives of the GOVERNMENT to the site.

b. There shall be no restrictions placed upon the GOVERNMENT, other than the conditions of 3.1, when the GOVERNMENT provides its own transportation to the site.

c. The GOVERNMENT shall furnish the SALVOR a written list of authorized representatives designated by the GOVERNMENT as observers and persons having access to the site, all vessels and activities. The GOVERNMENT shall make every effort to observe confidentiality as to all aspects of the survey and recovery operations, in view of the need to maintain a high level of security.

3.2. Records. All records pertaining to the survey and recovery operations, including those of the survey and excavation, ship logs, dive records and treatment of artifacts recovered shall be open to inspection by the GOVERNMENT upon request.

4. DIVISION OF PROPERTY

4.1. Appraisal of Recovered Items. Upon conclusion of the scientific study of the artifacts by the Archaeologist, the parties shall each appoint, at their own expense, an independent appraiser to determine the fair market value of each object within the collection of artifacts. If the

Agreement for Salvage

appraisals are in agreement in respect to any one object to within 10% of the higher figure, then the average of the two figures will be accepted. If the two appraisals are in variance in excess of 10% of the higher figure on any one object, and the GOVERNMENT and SALVOR cannot agree upon the appraised value, then a third appraiser will be appointed by the parties and the cost of the third appraiser equally shared. The average of the two nearest of the three appraisals will then be accepted.

4.2. Division of Items Recovered. The GOVERNMENT determines that it is in the best interests of the territory of Guam that, of any underwater historic property recovered by SALVOR, a fair share of the artifacts be retained by the GOVERNMENT for the benefit of the people of Guam, and that a fair share shall be assigned to the SALVOR. The artifacts shall be divided according to fair market value on the following percentage share basis - 75% shall be assigned to the SALVOR and 25% shall be retained by the GOVERNMENT. The GOVERNMENT shall have the right of first selection with regard to its 25% share of all the artifacts. After the GOVERNMENT has selected its 25% share, the SALVOR will then be permitted to select its 75% share. Should the GOVERNMENT desire to select artifacts in excess of its 25% share, the GOVERNMENT must pay the SALVOR, within 120 days, the fair market value of such artifacts.

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4.3. Sales to Guam Residents. In the event any of the artifacts are to be sold on the open market, the parties agree to provide a right of first refusal to the people of Guam with regard to their purchase. The asking price shall reflect the fair market value of the artifacts, any applicable taxes and shall include a fair profit for the seller. The right of first refusal shall extend for a period of thirty days from the time the artifact is first offered for sale to the people of Guam.

4.4. SALVOR as Agent for the GOVERNMENT. The SALVOR may, at the direction of the GOVERNMENT, act as the agent for the GOVERNMENT with regard to the sale on the open market of any artifacts belonging to the GOVERNMENT. In such a case, the SALVOR shall post a bond for the value of the artifacts to be sold prior to their removal from Guam. The bond will be relinquished only upon return of the artifacts to the GOVERNMENT or upon receipt by the GOVERNMENT of the agreed payment.

5. VIOLATION OF PERMIT TERMS

5.1. Breach. Should the SALVOR fail to observe or perform any term or condition of this Agreement, then the GOVERNMENT shall notify the SALVOR in writing of the exact nature of each breach of this Agreement. The SALVOR shall have thirty (30) days to correct the breach. Upon request by the SALVOR, additional time to correct the breach may be granted at the discretion of the GOVERNMENT. If the breach

Agreement for Salvage

is not cured within the allotted time, then this Agreement shall be terminated. In the event of termination, all artifacts recovered up until the date of termination shall be divided in accordance with Section 4 of this Agreement.

5.2. Temporary Halt to Operation. If the breach of this Agreement by the SALVOR is of such a nature that continued operations would place either artifacts or scientific information in jeopardy, the GOVERNMENT may require a temporary halt to operations until the breach is corrected.

6. DURATION

6.1. Term. The initial term of this Agreement shall be for a period of one year.

6.2. Extension of Term. If, during the initial term of this Agreement, SALVOR commences survey or recovery operations, then the Agreement may be renewed for consecutive periods of one (1) year each if agreed by both parties, provided:

a. SALVOR shall give written notice to the GOVERNMENT of SALVOR's intent to renew this Agreement not less than thirty (30) days prior to the expiration date of the initial term or of any renewal term, as the case may be.

b. SALVOR shall concurrently, with its written notice of intent to renew, pay to the GOVERNMENT an annual renewal fee of $1,000 dollars.

Agreement for Salvage

c. SALVOR shall, during each annual renewal period, conduct a fair and reasonable degree of survey or recovery activity within the designated area set forth in Attachment A, measured by reference to the particular circumstances including, but not limited to, weather, location of survey or recovery activities, depth, water conditions, time of day, day of week, availability of equipment, availability of qualified personnel and similar circumstances.

7. GENERAL PROVISIONS

7.1. Definition. As used in this Agreement, "underwater historic property" means any shipwreck, vessel, cargo, tackle or underwater archaeological specimen, including any found at refuse sites or submerged sites of former habitation, that has remained unclaimed for more than ten (10) years on the bottoms of any waters.

7.2. Title To Underwater Historic Property. SALVOR acknowledges that Government Code Section 13985.31 establishes the public policy that title to underwater historic property is vested in the territory of Guam, and that such underwater historic property is subject to the dominion and control of the territory of Guam.

a. All artifacts recovered shall remain the possession of the GOVERNMENT with the SALVOR responsible for their transportation, stabilization, curation,

Agreement for Salvage

maintenance, storage and security until the final distribution occurs as set forth in Section 4 of this Agreement.

b. Upon the final distribution of the artifacts, as set forth in Section 4 of this Agreement, each party shall assume complete control and responsibility for their share of the artifacts.

c. SALVOR shall secure and maintain loss protection insurance in the amount of One Hundred Thousand Dollars ($100,000.00), and shall provide a copy of the insurance policy to the GOVERNMENT. The GOVERNMENT shall be designated the beneficiary under the loss protection insurance policy. The policy will extend only to the artifacts recovered during such time as the SALVOR is responsible for them as specified in Section 7.2(a). Once the artifacts have been distributed pursuant to Section 4 of this Agreement, insurance coverage will be the responsibility of each party. The GOVERNMENT shall comply with every reasonable security measures imposed by the SALVOR and the insurance companies.

7.3. Compliance with All Laws. In conducting any of its activities under this Agreement, the SALVOR shall comply with all laws and regulations of the territory of Guam and the United States of America including, but not limited to, all laws and regulations governing navigation, marine resources and marine life. Additionally, prior to conducting any

Agreement for Salvage

survey or recovery operations, the SALVOR will be responsible for obtaining any permits, licenses or other clearances required by the federal or local government or any of its agencies and shall pay all charges and fees. The SALVOR shall pay all taxes due and payable as a result of survey and recovery operations conducted in accordance with the terms of this Agreement.

7.4. Assignment; Subcontracts. The rights of SALVOR under this Agreement are not transferable by SALVOR without the prior written consent of the GOVERNMENT.

7.5. Notice. Any notices required to be given under this Agreement shall be in writing and shall be delivered by registered or certified mail, postage prepaid and with a return receipt requested, by telex or personal delivery to the parties as follows:

If to SALVOR: Jack Dyer
P.O. Box 23905 GMF
Guam, M.I. 96921

If to GOVERNMENT: The Director
Department of Parks and Recreation
490 Naval Hospital Road
Agana Heights, Guam 96919

7.6. Indemnification by SALVOR. SALVOR shall save and hold harmless the GOVERNMENT and all its officers, agents and employees from any and all suits or actions of every nature and kind which may be brought for or on account of any

Agreement for Salvage

injury, death or damage arising or growing out of acts or omissions of the SALVOR, its officers, agents or employees under this Agreement.

7.7. Indemnification by GOVERNMENT. The GOVERNMENT shall save and hold harmless the SALVOR and all its officers, agents and employees from any and all suits or actions of every nature and kind which may be brought for or on account of any injury, death or damage arising or growing out of acts or omissions of the GOVERNMENT, its officers, agents or employees under this Agreement.

7.8. Publication Rights. The GOVERNMENT and the SALVOR shall have joint publication rights (including the print and electronic media) with respect to all aspects of the survey and recovery of the Nuestra Senora del Pilar, including all property retrieved from that vessel. The parties may agree to jointly prepare public information concerning the survey and recovery phases and on the property retrieved, including exhibitions and publications.

7.9. Adverse Ruling. Notwithstanding any ruling to the contrary by any court, the SALVOR holds himself duty bound to observe the terms and conditions of this Agreement.

7.10. Permit Modification. When effective, this Agreement will supersede Section 5 of the permit originally signed on May 5, 1987.

Agreement for Salvage

IN WITNESS WHEREOF, the parties hereby execute this Agreement.

DAVEY JONES ARCHAEOLOGY

By: _____ 9TH JULY 87.
TONY O'GRADY Date

_____ 20 JULY 87
ANTHONY C. MARIANO Date
Director, Department of
Parks & Recreation

APPROVAL AS TO FORM:

_____ 8/3/87
ELIZABETH BARRETT-ANDERSON Date
Attorney General

_____ 8/14/87
JOSEPH P. ADA Date
Governor of Guam

ATTACHMENT A

The area for survey and recovery operations will initially be a circle with center at:

Latitude 13 degrees, 15 minutes, 30 seconds North

Longitude 144 degrees, 39 minutes, 0 seconds East

and a radius of three (3) statute miles, with the exception of all areas where the jurisdiction of the submerged lands has been reserved to the U.S. Navy.

This initial area shall apply until such time as the actual extent of the area where the remains of the Nuestra Senora del Pilar are situated can be accurately delineated. At that time, the area for survey and recovery operations will be redefined to include the actual area of the remains, and such additional area as is needed to assure safe and orderly operations pursuant to the terms of the Agreement.

IMPORTANT DATES

China

Tang (T'ang) dynasty	AD618 – 906
Five dynasties	907 – 960
Song (Sung) dynasty	960 – 1279
Northern Song	960 – 1126
Southern Song	1127 – 1279
Yuan dynasty	1280 – 1368
Ming dynasty	1368 – 1644
Qing (Ching, Ch'ing, Manchu) dynasty	1645 – 1912

Philippines

Metal Age	200BC – AD600
Coming of the Spanish	1521

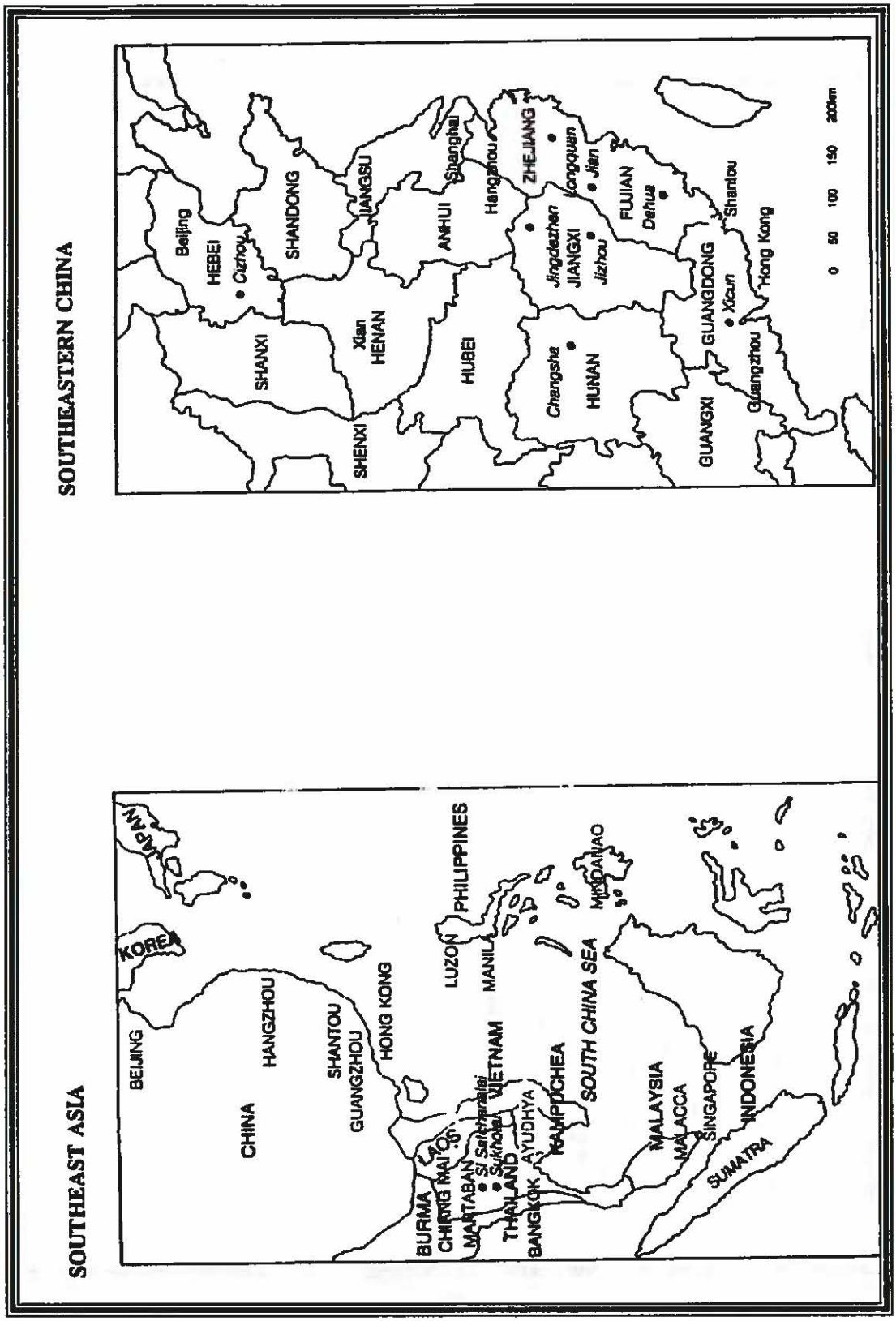
Thailand

Sawankhalok	1350 – 1500
Sukhotai	1350 – 1500

Vietnam

Early export	1200 – 1400
Middle export	1400 – 1600
Late export	1600 – 1700

TALKING CERAMICS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Shanghai
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FUJIAN
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Shantou
Jingdezhen
JIANGXI
Jizhou
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HONG KONG
CHINA
LUZON
PHILIPPINES
MANILA
MINDANAO
SOUTH CHINA SEA
VIETNAM
LAOS
CHIANG MAI
MARTABAN
Si Satchanalai
Sukhothai
THAILAND
AYUDHYA
BANGKOK
BURMA
KAMPUCHEA
MALAYSIA
MALACCA
SINGAPORE
INDONESIA
SUMATRA

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APPENDIX M - GLOSSARY.

The following definitions have been compiled and modified from a number of archaeological publications to assist non-archaeological personnel to understand the full scope of this project (ie See *McGimsey and Davis*, 1977; *King*, 1980; *NTHP*, 1984, 1985).

ARCHAEOLOGICAL RESOURCES: All evident of past human activity which can used to reconstruct the lifeways of past peoples. These include site, artifacts, environmental and all relevant information and the contexts in which they occur.

ARCHAEOLOGY: A scientific interdisciplinary set of methods and techniques for recovering, analyzing, interpreting, and explaining the unwritten portion of the historic and pre-historic past.

AVOIDANCE: Active attempts to avoid threatened resources by partial or complete project redesign or relocation.

CONSERVATION ARCHAEOLOGY: An approach to archaeology based on a philosophy stressing the protection, preservation and/or managed use of the cultural resource base for future generations, the protection of sites and preservation of data through scientific study .

CULTURAL RESOURCE MANAGEMENT: The development and maintenance of programs designed to protect, preserve, study and manage cultural resources. Developers of such programs may include governing bodies or agencies of government, academic and research institutions, and private corporations . The goal of such programs should be the conservation of cultural values and the maximum effective conservation and utilization of these resources for the public good.

CULTURAL RESOURCES: Districts, sites, structures, and objects and evidence of some importance to a culture, a subculture, or a community for scientific, traditional, religious, and other reasons. These resources and relevant environmental data are important for describing and reconstructing past lifeways, for interpreting human behavior, and for predicting future courses of cultural development.

CULTURE HISTORY: The chronological and spatial framework for describing the development of human societies and cultures, and the documented processes of change involved in this development. Studies in culture history are primarily concerned with defining the geographic extent, relative age, and course of development of cultures .

CULTURE PROCESS: The general factors and mechanisms responsible for cultural change and variability. In cultural resource management studies, investigations of culture process involve providing and testing explanations, expressed in terms of explicit formulations, for cultural events which occurred in the study area .

EMPIRICAL INVESTIGATIONS: Studies based on or derived from explicit experience, experiment, or observation.

ETHNOGRAPHIC RESOURCES: All evidence of identifiable ethnic lifeways dating in historic or protohistoric periods which may be used for describing, reconstructing, and interpreting cultural systems. These include sites, artifacts, ethnographic records, documentary records, informants, environmental data, and all other information. Ethnographic resources are cultural resources and may be considered archaeological resources when they provide needed information relative to the scientific study of archaeological resources.

concerning the human past and its potential use, 2) the acquisition and preservation of objects, sites, structures, etc., for public education and enjoyment, 3) educational and economic benefits from archaeological exhibits, and 4) practical applications of scientific findings acquired through archaeological investigations.

ARCHAEOLOGICAL RECORD: A record of archaeological data collected to preserve the integrity of sites after they have been excavated. The archaeological record includes artifacts and what they tell us about past human behavior.

ARCHAEOLOGICAL RECOVERY: May profess archaeological control over digging.

ARCHAEOLOGICAL TECHNICIAN: A person with practical experience, and knowledge in technical skills involving the description and conservation of archaeological materials, but without the formal training necessary to interpret the recovered evidence. Commonly thought of as a paraprofessional.

ENVIRONMENT ARCHAEOLOGY: The study of human adaptation to particularly environments using a wide variety of scientific techniques to analyze archaeological materials.

PRE-DISTURBANCE SURVEY: An initial site survey to map surface features, structures, and artifacts before anything is disturbed by excavation activities.

REMOTE SENSING: Surveying procedures for data collection by instruments that are operated at some distance from the surviving archaeological remains. Underwater work usually involves sidescan and sub-bottom sonars, magnetometers, metal detectors, fathometers, photography, and video.

RESCUE ARCHAEOLOGY: Excavations carried out on a site threatened by unavoidable destruction.

SALVAGE ARCHAEOLOGY: An approach used in an emergency situation based upon the need to make immediate archaeological recovery of material from threatened sites.

A list of the most common abbreviations used by Archaeologists and Administrators when dealing with Historic wreck sites:

OCS - Outer Continental Shelf
OAHP - Office of Archaeology and Historic Preservations
BLM - Bureau of Land Management
CRM - Cultural Resource Management
SOPA - Society of professional Archaeology
IAS - Interagency Archaeological Service
NPS - National park Service
SHA - Society of Historic Archaeology
ICUA - International Conference on Underwater Archaeology
ASCA - American Society for Conservation Archaeology
SHPO - State Historic Preservation Officer
NEPA - National Environmental Policy Act
EIS - Environmental Impact Statements
AIR - Archaeological Impact Reports
EAR - Environmental Analysis Reports
CEQ - Council on Environmental Quality
SAA - Society for American Archaeology
MMS - Minerals Management Service
USGS - United States Geological Service