THE TEST EXCAVATION
OF THE
WILLIAM SALTHOUSE WRECK SITE

An interim report

by

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ABSTRACT

The wreck site of a mid-19th century trading vessel, later identified as the William Salthouse, was discovered by divers in August 1982. Staff of the Maritime Archaeological Unit inspected the site in December 1982 and it was declared a historic shipwreck on 22 December 1982. During March and April 1983 a five week test excavation was carried out on the site to obtain information about the ship's cargo, methods of stowage, and to produce an overall site plan.

The William Salthouse was the first large vessel to sink inside Port Phillip Bay, just five years after the settlement of the region, and was the first recorded trading vessel ever to voyage direct from Canada to any Australian port.
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LIST OF ABBREVIATIONS

HRV.......................... Historical Records of Victoria
IJNA.......................... International Journal of Nautical Archaeology
PROVIC....................... Public Records Office, Victoria
SRL............................ State Reference Library, Victoria
VPRS.......................... Victorian Public Records Series
MAAV.......................... Maritime Archaeology Association of Victoria
MAU............................ Maritime Archaeological Unit
VAS............................ Victoria Archaeological Survey
1. INTRODUCTION

A wreck site, later identified as the William Salthouse, was located by two Geelong divers, Peter Kennedy and Dennis Bolton in August 1983 near Popes Eye in Port Phillip Bay (Figure 1). After observing the deterioration of the wreck site caused by other divers, the finders contacted the Maritime Archaeology Association of Victoria (MAAV) which arranged for the Maritime Archaeological Unit (MAU) of the Victoria Archaeological Survey (VAS) to visit the site.

The site was inspected by MAU staff accompanied by the finders and MAAV volunteers on the weekend of the 18/19 December 1982. The importance of this particular site was recognised and it was recommended for immediate provisional status as a Historic Shipwreck under the Historic Shipwrecks Act 1981 (Victoria). The wreck was gazetted on 22 December 1982.

During January 1983, a small number of visiting divers caused considerable surface damage to the site in a vain search for 'valuable' artefacts. This destruction led to the establishment of a 'Protected Zone' which prohibited diving within 250 m of the wreck site. The protected zone declaration took place on 9 February 1983.

The William Salthouse was the first ship to sail with a cargo of merchandise from the British Dominion of Canada to the British Colonies in Australia. At this time the British Navigation Acts attempted to prevent such direct trade between British Colonies and this voyage is an example of the mercantile spirit that led to the revocation of these Acts in 1849. Little is known about the origins and development of trade with Britain's North American colony, and consequently the William Salthouse site provides a unique opportunity to study the first cargo sent from Canada to Australia.

Eventually investigations of the cargo of the William Salthouse are expected to provide information relating to:

- packing of commodities;
- stowage of different types of cargo in the hold of the vessel;
- and distribution of the types of cargo within the vessel.

2. SOURCES OF INFORMATION

The type and variety of historical information that is required for the investigation of this vessel and its contents (so that archaeological and historical data can be matched) includes structural details of the ship’s hull, trade and shipping patterns, mercantile information and data pertaining to cargo items such as the barrels. There is a considerable amount of historical documentation available which details British shipbuilding techniques of the first half of the nineteenth century. Plans and accurate records of the methods and materials used in shipbuilding began to become commonplace during this period. Unfortunately many of the primary historical documents are not readily available in Australia though copies can be obtained through the National Maritime Museum, Greenwich; the Public Records Office, London; and other sources in Britain.

The most useful primary source available in Australia is undoubtedly the Lloyds Register of Shipping, held in the State Reference Library, which during the period 1824-1834 appeared in two volumes. After 1834 the Lloyds Register appeared as a single volume. The Lloyds Register of Shipping-Underwriters or Green Book was published for the shipping insurance underwriters and it this case contained more detailed information than its opposite number. The Lloyds Register of Shipping-Shipowners or Red Book was published for and distributed to the ship-owners. The Lloyds Registers of the period 1823-41 are also extremely useful in that they detail the classification requirements for vessels registered with Lloyds. In each volume tables of minimum fastening sizes, anchor and chain dimensions and scantling tables appear for vessels of 100 tons to 1,000 tons in 100 ton divisions.

Additional information was obtained from some of the texts on naval architecture
FIGURE 1: Three maps showing the position of the William Salthouse wreck site
which were published during the 19th century. These included Rees *Naval Architect* (1819–20) which gives dimensions of sails, methods of mast building and rigging and how blocks and ropes were made. Steel *Elements of Mastmaking, Sailmaking and Rigging* (1794) gave the details of the rope sizes, block types and sizes, dead eyes etc., required for a comparable vessel (330 ton Brig). This valuable reference includes a detailed glossary of terms and contains many drawings of rigging, masts, yards and sails.

Fincham's *History of Naval Architecture* (1851) proved useful on the subject of shipbuilding timber imports into Britain during the early nineteenth century, particularly the chapter 'On the Supply of Ship building timber'.

One of the most serious problems faced when utilising Lloyds Register is the lack of any record as to the fate of a vessel. Thus the vessel simply ceases to be listed with no indication as to whether she sank, was broken up, or was sold and reregistered.

In order to establish the history of the loss of the *William Salthouse* it became necessary to consult totally different sources in the contemporary newspapers. In 1841 and 1842 a total of four newspapers were published in the Port Phillip area, the *Port Phillip Gazette, Port Phillip Herald, Port Phillip Patriot* and *Geelong Advertiser*. These are accessible, usually on microfilm, at the State Reference Library. Independant confirmation that the *William Salthouse* was indeed lost in Port Phillip Bay in 1841 came from the *Nautical Journal* (1842) which lists losses of all British ships worldwide from 1832 onwards.

Despite an intensive search of the official correspondence held in the Public Records Office, only one reference to the *William Salthouse* could be found. Some of the relevant correspondence for the period was apparently destroyed last century together with other records which may have shed light on the vessel's fate.

There are few primary sources available which deal with dry, tight coopered casks and stowage during the first half of the nineteenth century. The best that appears to be available is Stevens (1863). While a much later source, Thomas (1942), indicates that cask stowage had not radically altered during a period of nearly 80 years.

The best possible primary sources are the original statutes enacted in Canada relating to cask sizes, timber types, brands and marks on the casks. Dated between 1829 and 1839 these statutes detailed the requirements for the packing and inspection of flour, pork, beef and fish barrels.

The work carried out by the Marine Excavation Unit of Parks Canada is without doubt the most comprehensive archaeological and historical investigation of casks carried out to date. Information from Parks Canada Research Bulletins No. 90, 123, 130, 206 and most particularly No. 208: *Bulk packaging in British North America 1758–1867: A guide to the Identification and Reproduction of Barrels* have proved invaluable.

Recently a variety of secondary material has been written about cooperage, casks and stowage including Horsley (1978), Lewis (1978) and Tuichinsky (1977). All of these books were utilised to provide background information for this report.

To date the question of the social and economic context of the trade between Canada and Australia has not been completely answered and this remains a task for the future.
3. HISTORICAL BACKGROUND

The William Salthouse was built for Salthouse & Co. at Liverpool in 1824. She was a copper-sheathed, single-decked brig (2 masts) of 251 tons (Lloyds Register of Shipping, 1824). In the Lloyds List for 1841 she is listed as a barque (3 masts).

From Lloyds Register the following trading history of the vessel was established: the William Salthouse was for many years involved in the West Indies trade visiting ports such as Havana, Demerara, Christiansted (Santa Cruz) and St Thomas. In 1831 the vessel, under a new master, altered her trading pattern becoming involved in voyages to Mauritius, India, Singapore and Batavia under the command of Captain Roberts. By 1841 she had changed ownership and the new owners, Green & Co., sent her on a voyage to Canada and onto the new Port Phillip Bay settlement in Australia. This was her first recorded voyage to Australia and the first voyage by any trading vessel direct from Canada to any Australian port. Her subsequent loss on the voyage was bemoaned by the press of the time (Port Phillip Patriot, 6.12.1841).

The William Salthouse was, we believe, the first vessel, excepting the prison ship Buffalo, with the Canadian rebels, that ever came direct from British North America to any of the Australian Colonies, the catastrophe is therefore doubly to be deplored as likely to cast a damp upon the opening of trade which might have proved highly advantageous to these Colonies.

On Saturday 27 November 1841 the William Salthouse attempted to enter Port Phillip Heads. With the tide at first quarter ebb and a strong south-westerly wind behind her, she hit a submerged rock off Port Nepean. The rudder became unshipped and within an hour she had 18 inches of water in the hold. The vessel was boarded by a pilot from Port Phillip Pilot station at Shortlands Bluff, Queenscliff who attempted to sail the vessel up the Bay using the part of the rudder which remained. She proved to be unmanageable as the water level had increased to six feet in the hold so an anchor was let go, the chain of which snapped as it was veered out. The vessel then ran ashore on the sand bank known as Pope's Eye, where Captain George Brown and the crew managed to save the ship's sails, her papers and some of their personal belongings, and escape in the ship's boats.

By the following morning the ship had sunk to the bottom and lay with six feet of water over her deck. That day the ship's agent Mr H.G. Ashurst went down to the wreck site aboard the cutter Emily to attempt to salvage part of her cargo. Also despatched to the wreck was Her Majesty's cutter Ranger, which arrived on the scene some 24 hours after the Emily. Captain Brignall wrote to the Harbour Master upon his return to Melbourne (8.12.1841):

For the information of His Honour the Superintendent, the state and position of the barque William Salthouse now lying with her hull some feet under water on the southern extremity of the eastern Sands between Western Channel and Synmonds Channel in three and a quarter fathoms water; Shortlands Bluff bearing W by South and Point Nepean SW half S. The weather has been so bad as to prevent approaching the wreck until late yesterday afternoon. (Brignall to Harbour Master, 4.12.1841; Port Phillip Gazette, 8.12.1841)

The immediate attempts at salvage proved futile due to increasingly stormy weather. The Emily was forced to return to Melbourne taking with her the crew of
the William Salthouse who had been staying at Shortlands Bluff Pilot Station. There appears to have been very little hope held of salvaging any major proportion of the cargo as the ship's agents, H.G. Ashurst & Co. very quickly arranged for the sale of the wreck complete with her cargo.

The William Salthouse with a cargo valued at £12,000 (see Appendix 1) was sold at auction by Messrs Carey & McDonnel on Tuesday 7 December 1841, to Captain James Cain for £275 (Port Phillip Herald, 10.12.1841).

Captain Cain's attempts at salvage proved to be singularly unsuccessful, due in part to the inclement weather and possibly also to salvage by unauthorised vessels. The schooner Diana, for example, left Geelong for Melbourne via the wreck of the William Salthouse (Geelong Advertiser, 13.12.1841) on 10 December, perhaps prompting an advertisement in the Port Phillip Gazette (15.12.1841) cautioning all persons from appropriating any portion of the wreck of the William Salthouse and making it known that 'Any person picking up any part ashore or afloat' could be paid a salvage on delivery to: James Cain, Queen's Wharf.

The wreck was resold at Messrs Carey & McDonnel's auction house on Saturday 18 December to Captain Cole for £110 (Port Phillip Herald, 21.12.1841). Captain Cole attempted further salvage by sending the Canadian built schooner Catherine along with the cutter Emily to the site. This enterprise appears to have been more successful than previous efforts leading to a report in the Port Phillip Gazette (29.12.1841) that

The wreck of the William Salthouse....the exertions of the men have hitherto been very successful in reserving portions of the cargo.

In an account of the early days in Victoria (Bride, 1969:288), Edward Bell mentions an aboriginal named Pigeon who was drowned at the wreck of the William Salthouse. No further details are given and it seems most likely that the accident occurred during one of the salvage attempts.

After this report the William Salthouse disappears from the archival record and her remains were not relocated for over 140 years.

4. AIMS

The major aim of the project was to make a detailed survey of the wreck site so as to provide a basis for site management in the future. Preliminary examination of the wreck site suggested that there was some possibility of damage by scouring caused by the strong tidal flow. It was deemed necessary to conduct some salvage work during the project as material was threatened by both scouring and possible removal by divers.

One aim was to document the methods of stowage employed so as to broaden our knowledge of these particular aspects. It was also decided to raise a selection of artefacts for display purposes and to form the basis of a reference collection of material from early shipwreck sites in Victoria. This decision was made in the knowledge that artefacts from this site were readily accessible and could be lost through looting. All artefacts removed from the site were accurately positioned on a site plan before they were raised.

In selecting areas for excavation, care was taken to ensure that the site was not inadvertently endangered.

5. THE WRECKSITE

The remains of the William Salthouse lie in 12 m of water and are buried in a 2 - 3 m sand ridge. The vessel lies in a tidal stream and the sand appears to have banked up over the hull as a result of the tidal action. The seabed around the site is sandy and depth variations of up to 3 m occur in the vicinity. The hull lies with the bow toward 120° magnetic and with a list to starboard of

5.
FIGURE 2: Plan of the William Salthouse wreck site

FIGURE 3: Diagram showing the method of access to the site under strong tidal conditions
approximately 20°, (Figure 2).

In the midships area structure remains to a height of 2 - 3 m above the keel with less than 0.5 m of the frames and planking visible above the sand. At the bow and stern, where the sand-cover is scoured away less remains. The port bow is intact 2 m above the keel and the starboard stern remains to a height of 1 - 2 m. Within the hull the cargo remains are remarkably intact. The top tiers of barrels have disintegrated and loose staves and lids are littered over the lower tiers which lie intact and buried in the sand. Some other cargo items such as timber and bottles are loose on the surface of the site together with structural and rigging components of the ship such as the lead bilge pump pipes, pulley sheaves and various iron concretions. The lower structure of the vessel appears to be intact, protected by the cargo and the build-up of sand within and around the hull. The site is approximately 25 m long and 8 m wide.

Material from the wreck site lies scattered on the seabed up to 50 m from the hull remains. Some of this scatter may have occurred at the time of sinking. For example, the sternpost-fishplate, found 60 m from the hull may have been broken by the first grounding and fallen from the stern post before the ship finally came to rest on the sea floor. The disintegration of the upper works, deck houses and crew's quarters after the vessel sank, could account for the remaining scattered material. As some of the cargo has been recently disturbed by divers, broken barrel lids and staves can also be found in the gullies surrounding the site.

6. METHODOLOGY

6.1 Operational

The Marine Science Laboratories (Ministry for Conservation), Queenscliff provided fieldwork facilities for the duration of the expedition. These included a secure wet-store for diving and excavation equipment, a large caravan for use as a field laboratory, access to equipment and boats and the time of staff members.

The boats used included the Maritime Archaeological Unit's 7 m Savage Marlin, various boats loaned by members of the Maritime Archaeology Association of Victoria, the National Safety Council of Victoria's 16 m Max Else II and Marine Science Laboratories 16 m Capitella.

The daily diving operations involved 3 or 4 staff members supplemented by 4 or more volunteers. During the excavation staff and volunteers averaged 1½ to 2 hours under water each day making a total of approximately 500 man hours worked on the site.

Strong tidal currents run at up to 2 or 3 knots near the Heads of Port Phillip Bay. Consequently most diving activities are restricted to the period at or about slack water. Fortunately the tides in the area are semi-diurnal and slack water can be predicted with considerable accuracy. However variation of up to an hour can be experienced caused by the prevailing winds. South-westerly winds bank up water in the Bay thus delaying the onset of the ebb tide while strong northerlies push water out of the Bay delaying the onset of the flood tide.

While diving can be carried out even when the tidal current is running strongly most underwater drawing, measuring, recording or excavation associated with a marine archaeological investigation is not possible under such conditions. Measuring tapes were bowed by the current, divers had great difficulty holding themselves in position, hookah hoses were dragged by the current and divers had great trouble getting to and from the site even with a system of lines. Because slack water in the area of the William Salthouse can last from 5 minutes (spring tides) to over an hour (neap tides), it proved necessary to begin and end a dive while the tidal current was running, though not at its strongest rate.

In order to safely guide divers (some of whom had not dived the site before) to and from the site, lines were used so that they could drag themselves along against the current. The boats were moored, line astern, from the large yellow 'Protected Zone' marker buoy which was positioned approximately 10 m to the north
FIGURE 4: Diver sketching the contents of a 1 m square grid frame onto drawing film on a perspex board

FIGURE 5: A complete barrel showing the fragile wooden hoops
of the stern of the wreck. Ropes were dropped alongside each boat and between the boats so that the divers could pull themselves towards the buoy and descend the anchor chain (Figure 3). At a depth of 9 m the diver would then take a horizontal line, the end of which was attached to the stern of the wreck. As the wreck site is located at or about 9 m, on a large sand ridge, the diver could remain at this depth for the duration of the dive without descending to the bottom which is as deep as 14 m in some places around the site. As an added precaution against decompression problems, divers' times were limited to the non-decompression limits for repetitive dives to 15 m.

The last boat in line astern from the buoy was designated as the rescue boat. It had an oxy-viva set aboard and the boat's tender was always ready to cast off and pick up any diver who drifted away in the current.

6.2 Site Survey

6.2.1 Objectives:
- To produce an accurate plan of the wreck site.
- To produce a complete photomosaic of the wreck site.
- To produce accurate plans of the 2 transect trenches.
- To produce complete and detailed photomosaics of the transect trenches.

6.2.2 Strategy

It was not possible to use a permanent grid system such as was utilised by Henderson (1976 & 1979) on the wreck site of the James Matthews because of the strong tidal current, which carried large quantities of kelp over the site and made installation of permanent horizontal lines impossible. Thus a system of vertical 'star' pickets was used to provide the control points from which all surveying could be carried out.

6.2.3 Methods

The overall site plan was produced by positioning 10 'star' pickets around the wreck site - these were positioned off the bow, stern and delimiting the areas to be examined in the two transect trenches. These points were at known distances apart and by triangulating from any two of them, any point on the wreck site could be uniquely defined and record the results onto a perspex board (Figure 4).

One hundred numbered white plastic tags were positioned on major hull features. These were used as the set points for the overall triangulation survey and as control points for the photomosaics. Each tag was triangulated from two 'star' pickets of known distance apart and this uniquely defined its position.

Two overall photomosaics were completed using Nikonos IVA cameras fitted with 15 mm lenses. One photomosaic was completed before excavation work took place using two Nikonos IVA's set up on a 500 mm aluminium bar to give a set of stereo photographs.

The second photomosaic was taken with a single Nikonos IVA later in the expedition. The photomosaics were completed by laying five bow to stern lines along the site, one at the centreline, two at 2 m on each side of the centreline and two along the outer edge of the hull structure, 4 m out of the centreline. A 1 m grid square was then flipped end over end and a photo taken of each one with sufficient overlap to join the next line of photographs.

Photographic recording and drawing were carried out in the two main trenches. Trench 1 was a transect trench of 9 x 2 m, approximately 10 m from the bow. This area in which complete barrels had been found, was just aft of the main timber stack and represented the main hold forward of the main mast. The trench was drawn and photographed using 1 m square grid frames which provided a scale and the means by which the prints could be rectified to produce a photomosaic. Trench (2) was a transect trench of 9 x 2 m aft of the main mast in an area in which it was expected more varied cargo items such as bottles, gunpoweder, fastenings, etc., would be found, (Figure 6)
FIGURE 6: Plan of trench 1 produced from the photomosaic and drawings made on site

Key to Figure 6

1. Outer planking
2. Frames
3. Partial Salt Beef tierce
4. Barrel staves
5. Tierce staves
6. " "
7. Complete Salt Beef tierces
8. " " " "
9. " " " "
10. " " " "

11. Complete salt beef tierce
12. " " " "
13. Iron concretion
14. Partial Salt Beef tierce
15. Salt Pork Barrel lid
16. Iron concretion
17. Puncheon (whiskey?)

FIGURE 7: 'Champagne' bottles still within a wickerwork basket partially buried in sand on the site
6.3 Excavation
6.3.1 Objectives
- To assess whether further excavation work is necessary and to allow any such work to be allocated an appropriate priority;
- To study and record the cargo and the methods of stowage;
- To raise for analysis, and later display, appropriate artefacts reflecting the needs of the first decade of European settlement in Victoria;
- To study and if possible raise for more detailed analysis the ship's bilge pumps.

6.3.2 Strategy
Trench 1 - This was a transect trench of approximately 9 m x 2 m in the main cargo hold area forward of the main mast in the region where most of the barrels were stowed. The information on methods of stowage, the extent and type of cargo remains was obtained from this area.

Trench 2 - This was a transect trench of approximately 9 m x 2 m just aft of the main mast of the vessel in the area where general cargo could be expected. This area was chosen as it was likely to be a source of artefacts such as bottles, fastenings, ships stores, and personal effects.

6.3.3 Methods
Hookah powered airlifts (100 mm diameter pipe) were used to remove the sand from the trench areas. Divers working in groups of 3 (1 supervisor and 2 divers) began removing the sand under a 1 m square grid frame. At a very early stage in the excavation work it was found that the method of holding the airlift down using a single short length of railway iron with a ring welded on the top, was likely to cause damage to the barrels. An improved system was suggested by Terry Brookes and Geoff Hewitt of the MAAV, using two weights positioned either side of the trench, with a line between them, the airlift could be attached to this line, slid along and so accurately controlled. In this way one diver would use the airlift to remove spoil, the second diver would remove broken barrel lids, staves and rocks from the area and the supervisor would draw and photograph the contents of the square. Sand, rocks and broken barrel staves were removed down to the level where coherent remains appeared, usually complete or semi complete barrels. Excavation work was halted when it was found that it was not possible to raise the barrels complete. As the waterlogged wooden hoops proved to be too fragile to hold the barrel together, the destruction of the barrels was deemed to be unwarranted. At this depth in the excavation the information burnt or stencilled on the barrel lids, barrel sizes, and type of dunnage was recorded without further excavation. The same method was used for excavating trench 1 and 2.

Two other areas were investigated during the expedition. The first of these was the area just forward of the main mast where sections of lead bilge pipe remained. Airlifting was carried out so that these sections of pipe could be removed and information about the mast area obtained. The final area investigated was to the stern of trench 2, where some baskets of champagne bottles and pine boxes containing bottles of wine were uncovered.

6.4 Conservation
6.4.1 Objectives:
To conserve artefacts raised during the excavation according to the guidelines laid down by ICOMOS.
To preserve these relics for display to the general public of Victoria.
To allow prolonged storage in order that more detailed analysis could be carried out on the artefacts.

6.4.2 Strategy
On site and post excavation methodologies employed followed those used by the Western Australian Maritime Museum's Department of Materials, Conservation and Restoration. (see bibliography: AIMA Newsletter No. 3. 1983).
6.4.3. Conservation Methods

For the duration of the excavation the Marine Sciences Laboratories at Queenscliff made available their mobile laboratory and a paved area for artefact storage and conservation work. The mobile laboratory, a caravan adapted for this purpose, provided benches and sinks for conservation, registration and drawing of artefacts. The paved area was used for the treatment and storage of artefacts in large plastic bins. All of the material was registered on site and the process of conserving, photographing and drawing the artefacts was started during the excavation.

6.4.3.1. On Site Conservation Methods:
(a) Stone, ceramic and glass.
Very little stone or ceramic was raised from the site. Those fragments recovered were stored in seawater and the process of removing salts from the material begun by gradual dilution of the wash solution over the period of excavation.

A large number of bottles were recovered from the site. As most of these were still corked and complete with their contents, they were stored in seawater, with the addition of panacide (200 micro litres per litre) to prevent biological deterioration of the corks.

(b) Non-ferrous metals.
A number of copper-alloy fittings were raised. These were deconcreted and treated with thiourea inhibited citric acid.

Small lead artefacts recovered included a lead flange, possibly part of the bilge pumps and thin lead sheet thought to have been used to wrap gunpowder. These items were deconcreted and stored dry.

The other lead items raised were the two bilge pumps, each of these consisting of two sections of lead pipe. These pumps posed a problem mainly because of their great weight. On investigation it was discovered that the lead cases still contained the plungers and foot valves which appeared to be made of wood and leather. It was necessary to remove these from the pipes in order to conserve the different materials and to investigate them further. A section of the plunger and foot valves removed. These were stored in water and phenol (to prevent the hardening of leather which may occur if panacide is used as the biocide). The lead portion of the pump with its copper lining was deconcreted and stored dry.

(c) Organic material.
A variety of organic materials such as wood, leather, rope and cane were recovered from the site. Conditions were favourable for the preservation of these items as the cargo was protected by the accumulation of sand inside the hull. Material on the surface was however subject to a strong tidal current and to biological attack and as most of the wooden items recovered were from the surface of the wreck site there is considerable Teredo damage to some pieces. Wood and other organic material such as rope and cane recovered from within the trenches were very well preserved. These artefacts were stored in water with panacide. Two fragments of leather shoes from the excavation were stored in freshwater with phenol.

(d) Bone.
The contents of one pork barrel were raised. All that remained was bones, with very little fat adhering. The bones were stored in seawater and panacide.

(e) Iron.
Very little ferrous material was raised from the site in consideration of the conservation problems related to iron objects and also as the interest lay in the cargo, very little of which was iron. The small iron concretions recovered
were either stored in caustic soda solution or were analysed on return to the mobile laboratory.

6.4.3.2. Post-Excavation Conservation
(a) Wood.
All of the wooden items recovered during the excavation were cleaned with a soft brush or with dental tools where necessary to remove concretion. Photographs of the artefacts were taken prior to treatment.
A large number of the barrel staves had iron stains or iron concretion remaining where the iron hoops had corroded away. These concretions were an interesting aspect of the staves but could not be retained, given the proposed treatment for the wood. The hygroscopic nature of the iron compounds present in the corrosion products result in 'weeping' as water is absorbed from the atmosphere. Where possible the wooden hoop fragments on the staves were retained. This may prove to be a problem in the future as they were sometimes associated with iron concretion and these staves will need to be watched closely after polyethylene glycol (PEG) treatment. As this treatment is reversible, the remaining iron concretions could be removed at a later stage if necessary.
The pine crates which contained the wine bottles were originally held together by iron fastenings. The remains of these nails are now iron concretions. These pieces also needed to be treated to remove the iron from the corrosion products present in the staves. Having removed as much of the concretions from the staves and the crates as possible by mechanical means, the artefacts were soaked for two days in a 10 - 20% solution of EDTA (ethylene diamine tetra acetic acid). The chemical normally used for this process is the disodium salt of EDTA; this has a pH = 5, necessary for the complexing reaction to occur. As this chemical is very expensive to use in the quantity required, it was decided to use the tetradsodium salt of EDTA, the solution of which has a pH of 11.5. Acetic acid was added to decrease the pH.
Material to be freeze-dried was selected from the organic material recovered from the William Salthouse. A range of barrel lids, barrel staves from the small barrel and a large barrel were chosen. The softwood crates which had contained the bottles, the plunger and foot valves from the bilge pumps and the capstan bar were also selected. These artefacts were soaked in PEG 400 (polyethylene-glycol with a molecular weight of 400) for ten days.
This pretreatment was necessary for the freeze drying process these articles were to undergo at the Queen Victoria Museum in Launceston. Shirley Lester (Curator of Conservation and Maritime Archaeology at the Queen Victoria Museum) has been contracted to carry out the freeze-drying on this material. After at least ten days soaking the wood was vacuum impregnated with PEG 400 and the drying process began. Depending on the size and nature of the wood this will take two to three weeks. After drying the state of the artefacts will be assessed and the necessity of treating the surface of the wood with higher molecular weight PEG reviewed. The remaining wooden items have been stored in water and panacide.

(b) Rope.
In addition to the wood, three pieces of rope were sent to the Queen Victoria Museum to be freeze-dried. These were cleaned and soaked in deionised water. They were then transferred to a solution of Luviskol (20%) which was used to impregnate and bulk the rope.

(c) Glass Ceramics and Stone.
Washing to remove salts from the glass, ceramics and stone has begun in freshwater. This process will be monitored until the salt concentration is reduced sufficiently for the material to be stable, (when the conductivity of wash solution is less than 200 micromhos). The glass and corks will then be stabilised by treatment with polyvinyl acetate.

(d) Copper alloys.
These items were deconcreted and treated with acid during the excavation.
FIGURE 8: (a) 'Champagne' bottle showing considerable marine growth and concretion. This bottle was found in trench 2.
(b) 'Champagne' bottle with no marine growth on the glass. This bottle was found in trench 2.
Further treatment required includes washing in a 2% NaHCO₃ (sodium bicarbonate) 2%Na₂CO₃ (sodium carbonate) solution for removal of chlorides, followed by treatment with benzotriazole and application of a protective coating such as Incralac.

7. RESULTS
7.1. Artefacts
7.1.1. Cargo Items
7.1.1.1. Bottles
(a) Champagne bottles.

Two dozen champagne bottles were recovered from two baskets found buried, almost intact in the stern area of the vessel. Inside these baskets the bottles were packed in straw and stacked horizontally with two alternate layers facing in opposite directions. (Figure 7) Most of the bottles recovered from the baskets were intact with their corks and contents. A total of 67 bottles of this type were raised during and after the excavation, some of which were found loose and others were still within their baskets. These bottles are of dark green glass, with an average height of approximately 200 mm (8 inches) (Figure 8). They have no seams and appear to have been free blown without the use of a dip mould. There is no definite shoulder on the bottle, instead the body gradually tapers to the neck. Pontil marks are present on these bottles but are not very rough or definite. The exaggerated kick-up on the base of these bottles would add strength, necessary for containers of fermenting liquid. The finish is a sheared top with an applied lip of glass with a ring seal. Striaations are visible in the glass, produced by the process of forming the necks.

The corks are large and extend two to three centimetres above the neck of the bottle. The corks have one or more grooves running up and over them. These grooves and the presence of an applied lip ring on the bottle neck indicate that wires were used to hold the cork in the bottle, although there is no metal remaining.

The glass in these bottles has many small bubbles, usually an indication of cheap glass, although the manufacture of the bottles seems to have been done with some care. The applied ring on the neck of the bottle is neater and the bottles themselves less asymmetrical than the other bottles from this site, despite the fact that no dip mould appears to have been used.

(b) Wine bottles.

Twenty bottles were recovered from two pine crates found in the stern area of the vessel. The bottles were packed in the crates, wrapped in straw. The corks and seals on most of them were intact and the bottles complete with contents. Some fragments of broken bottles were also recovered. These bottles are of fine, light-green glass and have an average height of 290 mm and an average base diameter of 60 mm. No seams are visible on the bottle and they appear to have been blown using a dip mould (a slight ridge is detectable at the shoulder of the bottles and the body is, very roughly, cylindrical). Pontil marks are present, but not very definite and the bottles have an exaggerated kick-up at the base (Figure 9).

The finish is a plain cylindrical mouth with no built-up lip (a sheared lip) but with an applied ring of glass. The corks are plain, generally protruding little from the bottle neck. In most cases an orange coloured seal is still present, although this has now become brittle. As there is no evidence of the use of wires to secure the corks it is possible that the applied ring of glass was designed to strengthen the bottle neck, rather than for use in the closure. Irregularity and asymmetry in the bottles,
FIGURE 9:  
(a) Wine bottle - one of a number of bottles found by divers and donated to VAS before the excavation started
(b) Stout or beer bottle found at the stern of the site. All of the stout bottles were empty and found outside the main hull area

FIGURE 10: Small medicine bottle (Full size)
together with the many small bubbles in the glass, indicates un-refined production methods.

Prior to this excavation seven bottles had been raised by divers from the site which were very similar to the group described here. These were larger, with an average height of 300 mm and a base diameter of 70 mm. They are of a heavier, darker green glass than the bottles found in the crates, with a more definite pontil mark but a less exaggerated kick-up on the base of the bottle.

(c) Beer or stout bottles.
Nine of these bottles were found individually and loose on the surface of the site. They are made of a very dark-green glass, have an average height of 280 mm (11 inches) and a base diameter of 80 mm (3 inches) (Figure 9b). No seams are visible, but a definite ridge is apparent on the shoulder of the bottles indicating the use of a dip mould in manufacture. The body of these bottles is almost cylindrical with a definite shoulder and a slightly shaped neck. The finish is different from that on the other types of bottle recovered from this site. The lip appears to have been rolled back to form two ridges tapering to the mouth of the bottle. No corks or contents were recovered. Pontil marks are evident, but are not very definite.

(d) Small medicine bottle.
This is a free blown bottle 9 x 6 mm high and 25 mm wide (4 in x 1 in). The body is cylindrical with an almost flat base. The pontil mark is slightly jagged. The bottle has a definite shoulder and neck with a flattened, everted rim (Figure 10).

7.1.1.2 Crates
Two pine crates were recovered from the site. These were approximately 500 mm x 200 mm x 360 mm (20 in x 8 in x 14 in) and each contained a dozen bottles of wine, wrapped in straw. The wood of the crates was originally fixed together with iron nails. These had completely corroded away leaving only powdery concretions. Something had been printed on the wood in black ink, but this was no longer discernible.

One crate (WS 63127) had a picture on one side showing a bottle, with a wine glass on either side, a symbol to indicate the fragile contents. One end of this crate had, in barely discernible print, the word 'muscat'. The other crate (WS 63128) had on one end the words 'Lichtenstein, Fins & CE Cette' surrounded by a border of small leaves in clusters. The other end of this crate also had printing, but this is no longer decipherable. One side of this crate had black markings which do not appear to be words.

The cargo manifest lists five cases of sauterne, but no other wine is mentioned. Chemical analysis indicates that the wine is a sauternes-style wine by the spectrum of acids determined by liquid chromatography. Both the alcohol content and sugar level are relatively high.

7.1.1.3 Baskets
The remains of the wickerwork baskets containing the champagne bottles were recovered and raised.

7.1.1.4 Barrels
(a) Barrel staves
Several examples of barrel staves with an average length of 720 mm (28 in) were raised. The staves show evidence of having been bound by both iron and wooden hoops. One of the staves has a small wooden nail which may have been used to temporarily hold the base or lid while the hoops were being fitted. One complete barrel was raised in pieces, as the fragile binding could not hold the staves together. This barrel was unusual as its base and
FIGURE 11: (a) 300 lb (42 gallon) salt beef tierce showing brand marks (May 1841) and two cooper's marks - the double B and the ornate G brands
(b) 200 lb (36 gallon) salt pork barrel lid showing both brand marks and stencil marks

FIGURE 12: Drawing showing one of the small 100 lb barrels containing briskets. The consignor's name is most likely to be H. Gilbert
lid have diameters of 360 mm (14 in), while the staves are only 300 mm (11 in) long. No evidence is available on the contents of this very squat container.

(b) Barrel lids:

During the excavation a variety of barrel lids of different sizes and different markings were raised. The printing on the lids gave definite information about the origin and date of sinking of the ship, as well as clearly indicating the contents of the barrels.

Beef. Lids of three different sizes were recorded and examples raised.

(i) Lids with an average diameter of 520 mm (20.5 in). These barrels contained 300 pounds of mess beef and were inspected by W. Moore in Montreal in 1840 or 1841. Most of these barrels are branded with a double B (which is thought to be the cooper's mark). It appears that these are lids from some of the 143 tiers of prime mess beef listed on the cargo manifest. A tiche has a capacity of 42 gallons. (Figure 11a, Table 1).

(ii) Smaller lids, having an average diameter of 440 mm (17 in) were recorded on the site. These barrels contained 200 pounds of mess beef and were also inspected by W. Moore of Montreal in 1840 or 1841. The double B brand appears on these lids. Eighty-three barrels of prime mess beef are included on the cargo manifest (barrels have a capacity of 36 gallons) (Figure 11b, Table 1).

(iii) One example from a 100 pound barrel containing ribs, rumps, and briskets was raised. This had a diameter of 350 mm (14 in), considerably smaller than the barrels of mess beef. The cargo manifest lists 15 barrels of briskets suggesting that the term 'barrels' was loosely used to describe containers of varying capacity (Figure 12, Table 1).

Pork.

A total of 355 barrels of pork are listed on the cargo manifest. Barrel lids were recorded on site with an average diameter of 440 mm (17 in) corresponding to the size of those recorded for the 'barrels' of mess beef. These barrels were of 200 pounds and generally inspected by W. Moore in Montreal in 1840 or 1841. Some slight variations are recorded in Table 2.

Flour.

Examples of lids from barrels of flour were also raised. These have diameters of 440 to 450 mm (17.5 in) and although no weight is recorded on the lid, they are of comparable size to the 'barrels' of beef and pork. A total of 394 barrels of flour are included on the cargo manifest. These barrels were inspected by W. Watson in Montreal in 1841 (the date also included 'June' in some cases). The contents were not actually marked as flour on the lids but the words 'Lachine Mills, Fine' appeared to indicate the contents (Figure 13, Table 3).

Fish.

Only one example of a marked barrel lid containing fish was found during the excavation. This was a 200 lb (barrel) of No. 1 herring marked: '200..., W Mac..., NO 1 HERR...., St John....' Another section of what was almost certainly a fish barrel was raised. This was marked: 'St Johns, NEW F LAND'. Indicating that the source of the fish consigned on the vessel was St Johns, Newfoundland - the main fishing port in Canada.

Dunnage:

The examples of dunnage raised were of three types:

(i) One example of a 'quoin' or 'bed' was found prior to the March-April excavation. This was a round of timber of 10 x 5 mm (4 in) diameter and 430 mm (17 in) long; slightly flattened along one side, with the opposite side hollowed to fit the curve of a barrel.

(ii) Other pieces of sawn timber were recorded on the site. These were wedge-shaped or small rounds of timbers, some of these may have been specifically
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<th>WS63106</th>
<th>WS63019</th>
<th>WS63101</th>
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<td>W. Moore</td>
<td>W. Moore</td>
<td>--</td>
<td>W. Moore</td>
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<tr>
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<td>--</td>
<td>Montreal</td>
<td>Montreal</td>
<td>--</td>
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<tr>
<td>Date</td>
<td>L.C. 1840 Oct.</td>
<td>--</td>
<td>L.C. 1840</td>
<td>--</td>
<td>L.C. 1841 May</td>
<td></td>
</tr>
<tr>
<td>Brand (see Fig 21)</td>
<td>double B</td>
<td>double B</td>
<td>--</td>
<td>double B</td>
<td>--</td>
<td>G and double B</td>
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<td>Diam.</td>
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<td>52 cm</td>
<td>44 cm</td>
<td>35 cm</td>
<td>50 cm</td>
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### TABLE 2. Pork Barrel Heads

**PORK**

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<td>M.</td>
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<td>WS63114</td>
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<td>--</td>
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</table>

**TABLE 3. Flour cask heads**
conservation. This process revealed that a wrought iron strap passed around the top of the plunger and was attached with iron fittings.

The foot valve was also of wood and turned to fit the taper of the pipe. A groove on the circumference of the valve contained some fibrous material remains which had apparently formed the seal between the valve and the pipe. The valve itself was made with a leather flap and a lead weight.

A lead fitting and two more sections of lead pipe are also thought to have been associated with the ship's pumps. Three wooden staves and a section of the pump support made of rope and tar were recovered from the base of the pump.

7.1.3.2 Fastenings
Examples of three types of fastening were recovered during the excavation
(a) Ten brass spikes of varying length.
   These are square in section and have a 'rose' head.
(b) Three copper bolts of varying dimensions.
(c) Sheathing tacks with flat, round heads, used to fasten the copper sheathing to the hull.

7.1.3.3. Fish plate
A portion of this fitting, bent and broken at one end, was found 60 m from the hull remains. This damage was most probably done when the vessel struck Point Nepean.

7.1.3.4. Miscellaneous
A number of other items associated with the ship's fittings included a ball of rope, two pulley sheaves, a wooden capstan handle and a turned wooden post.

Timbers.

Analysis of timber samples from the ship has been carried out by Mr Y. Illic of the Wood Science Group of the CSIRO, Division of Chemical Technology in Victoria.

Samples from a frame and a treenail were identified as white oak Quercus sp. Samples from the inner and outer planking were identified as Turtosa oldfieldia africana. This is an African timber used for ship building, and reported to be rarely attacked by marine borers (Bolza and Keating 1974).

Samples of wood from the barrels were also analysed. Those from a pork, beef and a flour barrel lid were identified as belonging to the white oak group Quercus sp while samples from different pork and flour barrel lids were identified as European oak Fraxinus? excelsior and elm Ulmus sp respectively. The barrel strapping material was analysed and identified as European ash Fraxinus? excelsior.

7.2. GENERAL

The cargo excavated in the two trenches was examined in detail, revealing the method of stowage, type of cargo and type of dunnage used. In trench 1, almost all of the barrels were found to be stowed fore and aft with the chines meeting fairly (Figure 17). The tiers were stowed 'bilge and cantline', the most efficient stowage method for barrels (see Appendix 2) and despite 140 years of immersion they were still in position. The heads of the barrels were not all facing in one direction as might be expected, to allow the contents to be determined easily from one side.

The barrel lids and the markings on them provided a large amount of information about the major cargo items, the date of packing of the barrels and the origin of the cargo (Figure 12). As this information corresponds to contemporary reports on the sinking of the William Salthouse, the site was easily identified.

The barrels are examples of the different types in use in the mid-19th
FIGURE 13: Drawing of a flour barrel showing three different markings:
(i) the brand marking indicating the consignor, the date and location etc
(ii) a stencil indicating LACHINE MILLS and
(iii) the cooper's marks under the stencil marks

FIGURE 14: (a) Drawing of upper right side of a pig (Sus scrofa) skull
(b) Drawing of lower left mandible of a pig
FIGURE 15: Two views of a clay pipe found on the port of trench 2

FIGURE 16: Three views of the top section of the lead bilge pump pipe
FIGURE 17: Complete barrels still stowed 'chine to chine' within the hull

FIGURE 18: Drawing showing the most complex cooper's mark overlaid by tally marks, found on any barrel during the excavation
cut for the purpose, but many appeared to be offcuts of timber with which packing was improvised.

(iii) Brushwood and cordwood was also found to have been used as dunnage.

7.1.1.5. Bones

The bones from one pork barrel were raised as a sample of the bones found on the site. Two beef bones were also recovered. Prior to the excavation a pig's skull was recovered from the surface of the wreck site, this is illustrated in Figure 14.

7.1.1.6. Gunpowder

Two sides of a wooden box of dimensions 360 x 160 x 180 mm (14 in x 6 in x 7 in) were found together with some crumpled lead sheet and material thought to be gun powder remains. Two more fragments of this lead sheet approximately 240 mm square (9.5 in) were found. These would have originally been folded to form a lead box which held gun powder.

7.1.2. Crew's Possessions

7.1.2.1 Claypipes

Two fragments of pipe stems and a pipe bowl with a broken stem were found buried in the silt amongst the barrels. The pipe bowl has on one side a thistle design and on the other a harp (Figure 15). A pipe of very similar design marked: 'T.W. and Co, EdinR' was recovered from the wreck of the Tigress in South Australia. This pipe was identified as having been manufactured in Edinburgh, Scotland by T.W. White and Company who made and exported pipes from 1832 to 1864 (Jeffrey, 1982). This design was, however, likely to have been in widespread use and the origin of the pipe from the William Salthouse site remains unclear.

7.2.2.2. Shoe heel

A small fragment of a leather shoe heel was recovered from the site.

7.1.3. Ship's Fittings

7.1.3.1. Pumps

A part of each of the two bilge pumps from the ship was raised. These are the lead pipes which housed the working section of the pump and are 1.52 m long and 180 mm in diameter. The pipe is cylindrical for 100 mm of its length and then tapers to a diameter of 120 mm at one end. At the other end, a box (250 mm square) is fitted, open at the end with a 120 mm diameter nozzle on one side (Figure 16). It was found necessary to remove a section of one of the pipes, cutting it out with an angle grinder, in order to conserve the plunger and foot valves which were still inside the pipe. The bore of the pipe is lined with thin copper sheet for 600 mm above the beginning of the taper. This is the section of pipe through which the plunger moved in the pumping action and the copper lining providing a smooth surface to reduce friction and wear and ensure a better seal.

The plunger is hardwood and is shaped at the top to accommodate an iron fitting with which it was attached to an iron or wooden rod. The bottom half of the plunger is turned to form a cylinder, which is covered on its outside by leather to provide a seal. In the centre is a small leather flapper valve, covering the top of the central bore of the plunger, but attached only on one side. Thus the leather acts as both the hinge and the seal for the valve. On top of the leather a shaped piece of wood is fixed to act as a weight to close the valve as the plunger rises. The concretion which was formed where the iron fitting was originally attached to the top of the plunger was removed during
century - firkins, tares, barrels, hogsheads and puncheons; and there are examples of both wet-coopered (iron-hooped) and dry-coopered (wooden-hooped) barrels. This is the only such collection of barrels in Australia.

An example of the beds used to hold the barrels in position was obtained from the bow area. Several triangular chocks were also located. These items were roughly shaped for the purpose, while other material used to support the barrels was not specifically designed as chocks, but were offcuts of timber. The dunnage appeared to vary considerably as in trench 1 cordwood, pine lengths, straw, wrapping material and rope was found wedged between the barrels.

The collection of bottles from the site provides an interesting example of intact material with a well defined date. Further study of these bottles could clarify their origin and provide information on the production and trade of wines in Canada in the 1840s.

8. DISCUSSION

8.1. Artefacts

The 67 champagne bottles raised from the wreck site represent the contents of 5 complete baskets (at 12 bottles per basket) and one incomplete basket. It is known that a number of these bottles were also recovered from the wreck site by divers prior to its declaration as a historic shipwreck. The source of these bottles is at present a mystery as it has not been determined whether the contents are genuine French champagne or not. Certainly the manifest specifies 20 baskets of champagne and if one takes this designation as being correct, then it was a worthwhile sideline to the main cargo. Champagne was selling in the colony at £3 per dozen Port Phillip Herald, 3.12.1841.

The 27 wine bottles recovered were of two types - one type (A) was 20 bottles from within two pine crates and the second type of bottle was slightly larger, darker green glass bottles. The cargo manifest lists five cases of sauterne but no other wine is mentioned. Analysis indicates that the contents of the type A bottles is a sauterne style wine. At this stage it cannot be determined if the terms muscat and sauterne were used to describe a similar wine type. However, the presence of two types of wine bottles on the site indicates that rather more than just the 5 cases of sauterne were being carried - perhaps as part of the captain's private cargo.

Finally, the black-glass beer or stout bottles raised would have been part of the crew's supplies.

Overall the three main types of bottles are fully representative of those in common usage during the first half of the nineteenth century. Generally free-blown or dip-moulded, with sheared tops and applied lips, exaggerated kick ups and often pontil marks visible. The wine appears to be sauterne, thus confirming the manifest, but seems to have made it to Australia the long way around: Lichtenstein to Britain, on to Canada and out to Australia.

Several lids from salt beef casks were recovered and these were usually marked and/or branded with a variety of information. Tierses usually contained about 42 gallons (wine measure) and in this case the brands indicated that they contained 300 lb of meat. However, when one considers the relevant statute (2 Vic. Cap (1839),15:162) it requires that 75 lb of coarse grain salt, 4 ounces of saltpetre and a sufficient quantity of pickle be added to each barrel. Consequently, approximately 113 lb of salt, saltpetre and pickle would have to be added to each tare. It must be assumed from the wording of the statute that the weight brand described the weight of fresh beef exclusive of weight of salt and the weight of the barrel. Thus the total weight of a full tare is likely to have been in the region of 420 lb.

Tierses, barrel and hilderkin or rundlet (half barrels) lids were represented among those raised from the site, on many of them the class of meat was branded. The casks contained two different classes of beef which are defined by the
The weights of the barrels are to be 196 pounds net, avoirdupois weight, for a barrel or 98 pounds net for a half barrel (2Vic.Cap (1839), 10:104). The statutes also laid down the dimensions of the barrels; staves to be 27 in. diameter of the head 16½ to 17 in. (2Vic.Cap (1839), 10:104). These measurements correspond closely to those recorded on site; staves 720 mm (28 in) and barrel lids 440 mm (17 in).

Barrels were to be made of seasoned oak or ash and bound with at least 10 wooden hoops secured by nails (2Vic.Cap (1839), 10:106). This is confirmed in part by the results of timber analysis which identified a Flour barrel lid as Quercus sp - white oak. Though equally another barrel lid proved to be made from elm Ulmus sp. The hoops proved to be ash Fraxinus excelsior. Cooper's marks and Talley marks were found on many of the barrel lids (Figure 18) and some of the variations are illustrated in Figure 19.

Only a single fish barrel lid was raised during the excavation but this was sufficient to demonstrate the fish barrels had also been subject to a similar inspection procedure to the salted meat casks. The contemporary statutes define the standards for classification as No.1 Herrings are described as:

- The quality number one, of Herrings....shall be the fattest, best and most superior fish.... (10 George IV (1829),7:182.)
- In all cases the casks contain the best or the higher quality of provisions. They are also all packed and inspected in Montreal within 1 year prior to the sailing of the vessel from Canada.

8.2. General Discussion

At present it has not clearly been established whether the cargo was sent as the result of a specific order or as a speculative venture. Certainly the available evidence suggests that H.G. Ashurst & Co. were the vessel's appointed agents and that they were expecting the vessel. This is contrary to the usual practice with a speculative cargo where the ship's master either acted as agent or arranged the appointment of an agent upon arrival in port. Thus, although there is no firm proof, it is likely that Ashurst corresponded with the vessel's British owners or agents to arrange for a specific cargo to be sent to the fledgling settlement. Certainly it would have been an extremely useful and very valuable cargo, probably resulting in considerable profit had it arrived at its intended destination. Any cargo valued at £12,000 was a very considerable one at that time, particularly when one considers that the total cost of running all the Government establishments in the settlement for 1841 was £63,000 (VPRS 8).

There is evidence that the demands of a shipping boom, together with a rapidly increasing population, put some strain on the settlement's food supplies; the population increased from 11738 in March 1841 to 20416 by December 1841 (Boys, 1935:129). Such a rapid and massive increase in population (nearly 74%) was mainly the result of immigrants coming into the colony under the bounty system, nearly 7000 in 1841 alone. Immigration agents who arranged the passage of many working class passengers to the colonies, were paid a bounty on each immigrant landed in the Colony. It is evident that H.G. Ashurst made a considerable fortune through the bounty system. However, even before 1841, food supplies had sometimes been a problem, particularly during the first years of settlement, a fact alluded to by various correspondents during the late 1830s, see Jones (1981):141. Lonsdale, the Superintendent at Port Phillip wrote to the Colonial Secretary in November 1838:

that there is scarcely any land under cultivation in this district...... There is no grain remaining unconsumed......(Jones, 1981)

In this context and with the closing of the Commissariat Store by the Governor in April 1840, it would not be surprising to find that H.G. Ashurst & Co. make out a specific order in 1840 to obtain a shipment of flour, salted fish and meat. However, it is possible that the intended market for much of the cargo of the William Salthouse would have been through a ship's victualling agent

29.
FIGURE 19: Cooper's marks recorded on barrel lids
or chandlery to the very ships which brought the immigrants. While the colonists could probably supply a considerable amount of their own supplies, in the form of fresh meat and other produce, this would be very limited use to ships intending to depart from the colony. These vessels having just completed a four to six month journey from Britain, would require sufficient salted meat and flour to supply the crews on their long voyage round Cape Horn back to Britain. While it would be possible to revictual the ships by sailing to another port, this would be economically unsound. This leaves us with the question why the salted meat supply could not be made from local stocks or from other Australian colonies. The most obvious answer being that the wool boom resulted in most sheep being kept for wool, any meat was consumed locally and besides mutton did not salt well. There were very few pigs in the Port Phillip settlement at that time, making it doubtful that the porcine population could provide sufficient numbers without resulting in a steady decline. Finally, live cattle were already being re-exported from Port Albert in East Gippsland and from Port Phillip to Tasmania, to resupply that colony after its cattle population had dramatically decreased (Billis and Kenyon, 1974). All round the demand in the colonies was for live animals to increase stocks or for wool, and those which had to be killed to eat were destined for the domestic market and not to supply overseas shipping.

The William Salthouse with its cargo of around 300 tierces of beef and 350 barrels of pork would have been a drop in the ocean if it was to supply the Port Phillip colony of 20000 people. However, as salted meat supplies for shipping leaving the settlement, it both provided a considerable proportion of the total amount required, and had the added advantage of maintaining domestic animal populations.

A proposed victualling scale for 1847 (Charlwood, 1981:195) indicates that a seaman consumed one twelfth of a tierce of beef and one tenth of a barrel of pork per month. Thus a vessel of approximately the same size as the William Salthouse with a crew of 10 to 12 would require approximately one tierce of beef and one barrel of pork per month. This would amount to approximately 4 tierces of beef and 4 barrels of pork to sustain the crew on the 4 month return voyage to Britain.

When one considers that the number of shipping departures from Port Phillip Bay for 1841 was 272, the cargo carried by the William Salthouse would be enough to supply approximately 1/3 of these vessels with sufficient salted meat to complete their voyage back to Britain. Thus, a cargo of salted provisions would be worth considerably more to a ship’s victualling agent than if it was sold to the colonists. H.G. Ashurst & Co. had a potentially very lucrative cargo.

9. CONCLUSIONS

The archaeological investigation categorically established the identity of the wreck site as the William Salthouse. The William Salthouse was a typical British small trading vessel of the first half of the nineteenth century. She was designed and built for carrying mixed cargoes, she spent her 17 years carrying cargoes between Britain and the British colonies in the West Indies, then to India and finally Australia. Little can be learned from the structure of the vessel as there is considerable historical documentation detailing the techniques and materials which were used in the construction of hundreds of similar vessels.

The greatest archaeological value of the vessel lay in her cargo, particularly the casks. While there is some historical documentation available on casks and cask stowage, much of this is from a considerably later period. The two to three complete or semi-complete tiers of casks will require much more work to establish the answers to questions about stowage and marking. For these reasons she is now a declared historic shipwreck site and fully protected under the Historic Shipwrecks Act (1981). This preliminary investigation has demonstrated that there is potentially much valuable data to be obtained from a
more detailed study of the remains of her cargo. Indeed recent communications with Canada indicate that the vessel is of considerable interest to maritime archaeologists and historians there as well as here.

There are several questions which need to be addressed in future research.

For example:
- Is the sample representative of the entire cargo?
- Are there any examples of barrels which have been branded in defiance of the statutes?
- Are the samples of stowage representative?
- Does the bottom tier simply stack onto the ceiling planking or are there chocks and quoins in position?
- How often are chocks used in the cargo?
- Dunnage types - are the wide varieties consistent - or unusual in this brig?
- Why do the branded heads face in different directions - does it matter?
- How typical was this cargo for this period?

LIST OF ABBREVIATIONS

HRV....................Historical Records of Victoria
IJNA....................International Journal of Nautical Archaeology
PROVIC..................Public Records Office, Victoria
SRL......................State Reference Library, Victoria
VPRS.....................Victorian Public Records Series

APPENDIX I

CARGO MANIFEST as listed in the Port Phillip Herald 10 December 1841.

143 tierces prime mess beef
83 barrels prime mess beef
15 barrels briskets
355 barrels prime mess pork
40 kegs tongues
394 barrels flour
20 kits rounds beef and tongues
6 hogsheads cider
5 punchions whiskey
7 cases snuff
26 casks nails
31 cases crackers
66 dozen corn brooms & handspikes
50 pieces boards
25 boxes London blue
5 cases sauterne
20 baskets champagne
5 cases mustard
1000 bars iron
59 casks dry cod fish
40 boxes large table fish
26 tierces No.1 salmon
4 barrels No.1 mackeral
20 barrels No.1 herrings
10 casks vinegar
100 pairs ash oars
498 pieces white pine boards
812 white pine deals
APPENDIX 2

BARRELS AND THEIR STOWAGE
Cooperage is the term used for the making of wooden containers from staves and hoops; the general term for these containers is cask or more recently barrel. Casks were used for storing goods such as flour, salt meat, wines, spirits, beer and fastenings aboard ships during the 18th and 19th centuries. The cooper was an important member of the ship's complement as he was responsible for the repairing of casks and such containers as pails, buckets and tubs while the ship was at sea. There are three branches of the cooper's trade, two of which are of interest when considering the cargo of the William Salthouse. The first and most highly skilled of these branches was wet cooperage which is the making of wooden casks with iron hoops to contain liquids. These containers had to be completely water tight which meant the staves had to fit together very accurately and closely. Wet coopered casks were usually made from oak. American oak was preferred for spirits, Mediterranean oak for wines and northern European oak for beer. The second branch of the coopering trade was dry cooperage in which the barrels were made with wooden hoops, usually ash or hazel, and used to contain dry goods such as flour. Dry coopered barrels were usually made from Douglas Fir but sometimes Elm, Spruce, Poplar or Beech was used for the staves (Kilby, 1977). Barrels were named differently according to their capacity (Thomas 1942:86).

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<th></th>
<th>Equal to</th>
<th>Approximate capacity</th>
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<tr>
<td>firkin (keg)</td>
<td>¼</td>
<td>9</td>
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<tr>
<td>anker</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>Kilderkin or rundlet</td>
<td>¼</td>
<td>18</td>
</tr>
<tr>
<td>barrel</td>
<td>1</td>
<td>36</td>
</tr>
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<td>tierce</td>
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<td>hogshead</td>
<td>1½</td>
<td>54</td>
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<td>puncheon</td>
<td>2</td>
<td>72</td>
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<tr>
<td>butt or pine</td>
<td>3</td>
<td>108</td>
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<tr>
<td>tun</td>
<td>7</td>
<td>252</td>
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Storage of cargoes is an important task as the manner in which it is carried out may effect the stability and seaworthiness of the vessel, the preservation of the goods and the rate at which the vessel is capable of discharging her cargo. Barrels may be stowed 'bilge and cantline' or 'bilge and bilge'. The bilge is the greatest circumference of the barrel; the cantline is the space between the upper part of two casks placed side by side. The 'bilge and cantline' method of stowage is more stable and takes less space. The bilge is kept free by the use of beds, placed under the barrels, with 'quoins', shaped pieces of wood, used at the sides to prevent movement of the barrels on the beds. Dunnage is used to pack the spaces between the barrels and the vessel's bulkheads, pillars, ladders etc.
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10 George IV Cap 7 1829 Prince Edward Island.
An Act to regulate the size of Barrels and enforce the Inspection of such Pickled Fish as may be exported.

10 George IV Cap 30 1829 Nova Scotia.
An Act in amendment of the Act, entitled. An Act for the more effectually enforcing the Inspection and encouraging the Exportation of Pickled Fish.

2 Vic. Cap 15 1839 Lower Canada.
An Ordinance to regulate the curing, packing and inspection of Beef and Pork, intended for exportation.

2 Vic. Cap 10 1839 Province of Quebec
An Ordinance to suspend certain Acts therein mentioned, and to regulate in a better manner the Packing and Inspection of Flour and Indian meal.

2 Vic. Cap 59 1839 Lower Canada.
An Ordinance to suspend for a limited time, certain sections of the Ordinance for the better packing and Inspection of Flour and Meal.

Copies of these statutes were obtained through the Marine Excavations Unit, Parks Canada, Ottawa, Canada.

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