Report of the Excavations of Previously Disturbed Land Sites

Associated with the VOC ship *Zuytdorp*, wrecked

1712, Zuytdorp Cliffs, Western Australia

A report to the Western Australian Maritime Museum, Fremantle Western Australia

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Report of the Excavations of Previously Disturbed Land Sites Associated with the VOC Ship Zuytdorp, wrecked 1712, Zuytdorp Cliffs, Western Australia

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by Fiona Weaver, Sept. 1990

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1. Introduction

1.1. Background

The VOC (de Vereenigde Oost-Indische Compagnie, or United East India Company) ship Zuytdorp, is one of several which have been lost in waters off the West Australian coast (Henderson, 1986; Playford, 1959). The Zuytdorp differs from the other Dutch wrecks (Drake-Brockman, 1963; Henderson, 1980, 1986; Ingelman-Sundberg, 1977), because it lies at the base of cliffs and that there is no record of the people aboard the ship, and their fate.

The Zuytdorp disappeared after 22 April , 1712 when it left the Cape of Good Hope bound for Batavia. It was a journey made by more than 30 other VOC ships per year.

During the lifetime of the company (1602-1799) seven ships disappeared on this route. From the Cape of Good Hope, the ships ran down their eastings until they sighted the West Australian coast and then turn north to Batavia. No survivors were sought from the Zuytdorp as there was no indication of where it might have disappeared during the three month voyage (Playford, 1959).

The Zuytdorp was wrecked at 27°11.10S, 113°36E, approximately 40 km north of the Murchison River (Figure 1). The site is at the base of limestone cliffs which run for 160 km from the Murchison River to Dirk Hartog Island, and range in height from 30&emdash;250 m in height. Scree slopes offer routes to a wave-cut platform at the base of the cliffs. The platform is littered with limestone boulders.

The vegetation on top of the cliffs is stunted, salt tolerant coastal heath growing on windswept limestone and sand. Further inland, tea-tree scrub, patches of mallee, Acacia and Banksia thickets, can be found (Morse, 1988). Deep narrow gullies with limestone outcrops run toward the cliffs. These are a common feature of the Cliff Top area. They do not contain permanent water but may flow for short periods during winter. A number of soaks exist a few kilometres inland which were used by Aborigines (Morse, 1988) and native fauna (Lamara and McCarthy, pers. comm.).

The wreckage of the Zuytdorp was first reported by Tom Pepper, a stockman at Murchison House Station, who claims to have found it in April 1927. During the next 10 years artefacts were removed from the locality by Station people (Playford, 1959).

1.2. Investigations at the site

The first organised expedition to the site was by the Sunday Times newspaper, in 1941, after rumours reached Geraldton and Perth of the shipwreck. The inhospitable conditions and remoteness of the site lead to the expedition being abandoned (Playford, 1959).

In 1954, P.E. Playford, a geologist working at Tamala Station was shown the way to the wreck by Tom Pepper. He then sought backing from the West Australian Newspapers to fund an expedition. More artefacts were located along with evidence apparently indicating movements of survivors. Another expedition was mounted in 1958, after Playford was able to identify the wreck as the Zuytdorp from coins dated 1711!

During these expeditions, digging for artefacts was undertaken and searches were

conducted for material in a radius of several kilometres both at the base and top of the cliffs. Sandy areas east of the Cliff Top immediately above the wreck were deeply ploughed by a tractor in search of artefacts and a campsite (Playford, 1959).

Since 1958, the area has been regularly visited by many 'treasure hunters'. Since 1970, the Western Australian Museum (WAM) has also made regular trips to the site, and successfully retrieved material, notably coins from the wreck in 1971 and 1978. The wreck site, and an area on the land adjacent, was declared a restricted area to limit further 'treasure hunting'. Despite this, the visits continued unauthorised.

Museum activities ceased in 1981. However, the work was resumed in 1986 when Mike McCarthy of the WA Museum Archaeology Department assumed responsibility for the project.

In April&endash;May 1987, following work on the wreck site itself, an expedition, the first in Western Australia to involve maritime, prehistoric and historic archaeology was conducted with a view to assessing the physical remains on land.

Kate Morse of the Anthropology Department, WAM, conducted a survey of Aboriginal shell middens along the Cliff Top areas to determine whether they pre or post dated the wreck, and whether the depositors were Aboriginal or European (Morse, 1988). This author directed excavations in areas of reef/cliff slope adjacent to the shipwreck site searching for evidence of wreck survivors.

In view of the disturbance known to have occurred since 1927, 'wa there remaining evidence of the survivors from the wreck and if so, what is its condition and what conclusions can be drawn from it'.

1.3 Aims

Areas of visible deposits on reef/cliff slope adjacent to the wreck site were investigated as likely areas for excavation. From excavations it was hoped the following aims would be achieved:

1. To determine the extent of remaining in situ European artefacts

2. To determine the main concentrations of European material and whether the surface observations were reflected in the archaeological deposit

3. To determine the degree of disturbance of the main concentrations of European material, and whether this disturbance could be attributed to human or natural causes

4. To compare the evidence recorded in Playford (1959) of occurrences of artefactual material (e.g. breech blocks), and subsurface observations (e.g. fire places), with the evidence revealed through excavation

5. To provide archaeological evidence to complement research undertaken on the wreck of the Zuytdorp.

2. Methodology

2.1. Criteria for excavation areas

The following criteria were used to choose areas for excavation:

- areas of visible European remains

- areas most likely to have been used by any survivors

- areas which were accessible and could be cleared sufficiently of surface material (boulders) to enable a good sample excavation

- areas which it was thought Playford et al., (1959) and already covered in previous expeditions

- areas where campsites might have been located

- areas most likely to be destroyed by future 'treasure hunters'.

Two sites satisfied the above criteria: the Breech Block area as described by Playford (1959), and the area immediately above the wreck site on the Cliff Top (Figure 2).

2.2. Excavation procedure

A grid of one metre squares was established north-south over the site. It was numbered according to the alphnumeric system, the origin being the south-east corner. The southern axis was numerical and the eastern axis was alphabetical.

Prior to excavation, the ground level of the site was recorded at 1 m intervals, and surface collections were taken for each square and bagged separately. The condition of any vegetation, type of artefactural material, colour of sand, rocks etc., on the surface of each square was noted.

Trowels were used to excavate arbitrary spits, usually about 10 cm in depth, unless natural stratigraphy was apparent. Where the area being excavated proved to be confused, stratigraphy non-existant, and where little or no artefactural material was obvious, shovels were used.

All excavated deposit was sieved through 7 mm, 4 mm and 2 mm mesh sizes. All excavated artefacts were collected and stored in plastic bags labelled with the coordinates of the square, and the spit from which they were derived. All fragile material such as clay pipe fragments, were excavated cautiously and immediately placed with paper towel into plastic vials, or padded plastic bags. This procedure was adequate for protection from damage until further analysis was commenced at the Fremantle Maritime Museum.

Photographic, video and drawn records were made as required during the excavation.

3. The Breech Block site

3.1. The site

The Breech Block site is located at the base of cliffs and a scree slope, about 10-20 m from the sea behind a wave-cut platform. There are few areas of clear sand. This area was chosen because it was where the breech blocks were found in the 1930s. The Breech Block area is near a point of confluence of scree debris suggesting that artefacts might have washed down slope from cave and platform areas above. It was suggested (McCarthy, pers comm.) that this previously disturbed area of sand with a boulder (approximately 3 x 3 m) to one side, could have provided an early camp after the wreckage. The breech blocks could have been used as deterrants to attackers whether these be Aborigines, other survivors, or imagined animals, or as a means of signalling would be rescuers. It was a logical choice for excavation because boulders could be

removed to allow access to the sand and visible European artefacts.

3.2. The excavations

3.2.1. The spoil heap area

The spoil heap area was excavated at the same time as Trench A. This area held no stratigraphic significance as it was fill and rubble from an earlier visit. Once this area was cleared sand sieved it exposed the face abutting squares A4, A5 and A6, to a depth of 1 m. Material recovered from the sieve included fragments of iron, copper and shell. Hard packed sand was reached and noted that it sloped up towards squares A5 and A6. After recording, the area was back-filled and used as a spoil heap for sieved material.

3.2.2. The Breech Block site

Four trenches totalling 21 1 x 1 m squares were excavated. Tench A (1 x 7 m) encompassed areas where copper fragments were visible on the surface, and a face which had been exposed in the spoil heap excavation. The remaining squares covered the available open space of the site, and a large rock in the south-west corner of the site (figure or plate of site area).

The matrix of the site comprised loose orange/pink sand with limestone rubble, on top of a compacted orange sand base layer. On and within this base layer, small cracks or fissures were found which held beach sand. Artefacts were recovered from several of these fissures.

As the site is at the base of a scree slope, some downslope movement of artefacts was anticipated. The large rock in the south-west corner of the site was considered a possible artefact accumulation area as a result of downslope movement or as a centre of activity. Some diagnostic artefacts were located around the rock in various squares: a flat iron bar, iron tacks, iron bolt, copper alloy globule, copper hinge, musket ball, a bale seal, since identified as a piece of 4 silver coin. Call it a piece of four, and wood, as well as evidence of fire activity.

Artefacts were recovered from throughout the deposit in Trench A. In the remaining three tenches, the depth of deposit was shallow, and artefacts were found mainly in the top 10 cm or in the cracks in the compacted sand base layer.

3.3. Results

3.3.1. Metal

At the Breech Block site excavation, metal was recovered from every square (Table 1).

Iron

A total of 6.185 kg of iron was recorded, the majority consisting of spike fragments and amorphous iron present in almost every square. The remaining iron consisted of flat iron, small nail fragments, bolts, and flat headed tacks.

The distribution of iron does not suggest areas of artefact concentration, nor any downslope movement. However, the greatest amount of iron recorded was in Trench A. This could be explained as a result of the greater depth of deposit in this trench compared to the main excavation area.

Copper

Copper was recorded from all but one square (E6), totalling 246 g. The greatest quantity was recovered from Trench A (approximately 201 g), primarily from squares A1 and A2.

A copper hinge was recovered from Square C6, and might have been associated with the fire remains of squares B7 and C7. Amongst the Zeewijk artefacts (Ingleman-Sundber, 1978A), hinges were noted as bronze. Until further analysis has been conducted, this artefact will be described as copper alloy.

Silver

The bale seal, a piece of 4, recovered from square B6 has been identified as a piece of four. In a piece of eight, there is a piece of four and two reals. The numbers stamped on the face (Fig/Plate) signify a revaluing of the coin which John Carpenter (Conservator, WA Maritime Museum) believes is silver rather than lead or pewter. The counter stamp

of this type was applied to coins minted and used in Brazil. This seal was a world currency, based on the value of silver, at the time of the Zuytdorp wreck.

Lead

A musket ball was located in the fireplace area.

3.3.2. Wood

In the top 10 cm of square B7, several splinters of a fine grained wood were recorded in association with iron, copper, charcoal and shells (Table 1). The species of wood is yet to be identified.

3.3.3. Charcoal

Small amounts of charcoal were recovered from five squares: A7, B7, C7, C8 and D8 (Table 1). In squares A7 and B7 a thin layer of charcoal and orange ash was revealed a few centimetres below the surface. In the first 10 cms of square B7, charcoal and wood were recovered. This wood was neither burnt or natural to the site. In square C7, fine charcoal was evident across the square, but no ash layer was obvious.

A few centimetres below the surface in square C8, the ash layer - charcoal, ash/sand matrix - was uncovered, having a depth of 2 cm. An abalone shell was uncovered with charcoal and sand inside the cavity. The shell was not burnt nor was there evidence to suggest that it had been part of a fire. The ash layer was also revealed in square D8. The surrounding matrix was of a darker appearance than in other squares.

The extent of the thin layer of charcoal and orange ash/sand across an 8 m square area, suggests a fire of undefined size. The thinness of the ash layer, and incomplete coverage of the area suggests that this 'fireplace' area has been disturbed.

3.3.4. Shell

Some large limpet and oyster fragments were noted on the surface of the excavation area. At least 10 species of shell were recorded throughout the deposit, and from all but one square (E5). The species included limpet, oyster, whelk, abalone, nerites, barnacle, mussel, snails and fossil snails, for a total weight of 1546.9 g (Table 1).

The majority of shell fragments were recovered from the southern squares, and the numbers of fragments seem to decrease as the site slopes upwards. The main species recovered from the excavation were limpet, oyster and abalone. These species were the largest fragmented remains, and as a food source, they offer more 'meat' content than other species found in the site. It can be noted that limpet remains contained 44 whole valves which might indicate use and discard.

3.3.5. Disturbance evidence

Four pick marks were revealed in square E7 after compacted sand base was reached and the square was swept. No picks had been used during this excavation.

4. The Cliff Top site

4.1. Site description

The Cliff Top site is located immediately above the wreck site. From this area there is access to the wave cut platform below, and to the Breech Block site (Figure 2). To the west of the site, a remnant of the cliff face remains, which could have afforded shelter for any survivors, from wind and rain. The surface vegetation of the area consists of 'pig-face' and Acacia scrub. A thin sand deposit exists in this area, with some iron fragments on the surface. To the east there is a wide runoff gully which ends at the cliff edge. The whole area slopes gently from north-west to south-east towards the runoff gully and the edge of the cliffs. A road was bulldozed down the hill in the 1970s to just above the site to enable heavy excavation (Figure 2).

4.2. The Excavations.

4.2.1. The 'Runoff' gully

A section of the 'runoff' gully was chosen as the most appropriate place to sieve deposit. The area was trowelled prior to the commencement of the main excavation. Blown sand filled the small hollows of the heavily pitted limestone base. Within one of the hollows, two fragments or worn case bottle glass were located.

4.2.2. The Cliff Top site

Two trenches were set out north-south and east-west to form a backwards L shape across the site. These trenches encompassed two areas of heavy surface material (iron fragments) with the hope that the amount of surface material might be mirrored in the archaeological deposit. These trenches were designed to give an indication of site stratigraphy and the location of artefact concentration from which to plan excavation procedure. When excavation ceased, 63 - 1 x 1 m squares had been excavated.

Surface collections of the squares prior to excavation yielded fragments of iron and sheet metal, amorphous iron, nails, a copper globule and fragments, and one ring pull top. Wherever vegetation was removed, a build-up of sand, and often a corresponding accumulation of artefacts, was noted.

Stratigraphy was almost non-existent across the site. The matrix is of fine sand, roots and limestone gravel, often above a limestone gravel and shell layer, above a compacted limestone base. A fine charcoal layer was visible in the profile of a few squares, but its extent was unclear, possibly as a result of earlier disturbances to the site.

The majority of artefacts were located in the top 15-20 cm of deposit. The majority of shells were located at the base of the deposit, although some were located within the deposit. The mixing of deposit, and absence of layering of cultural material, suggests extensive disturbance of the site.

Some artefacts appeared to be in situ, however it is possible that these too have been shifted by disturbance.

Amongst the artefacts recovered from this excavation area there were: iron, copper, case bottle glass, clay pipe fragments, wood, charcoal, shell, cork, leather and slate (Table 2).

4.2.3. Test pit one

A 1 x 1 m test pit was excavated at a location chosen at random in the area up-slope from the Cliff Top site. The purpose of the test pit was as a control for comparison to the material excavated down-slope. No artefacts were found in the pit.

The matrix was a dark brown to grey sand through to limestone base rock. Sparse fragments of shell (limpet and chiton) were noted just above the limestone base. No obvious limestone rubble layer was recorded. The maximum depth of the test pit was about 50 cm (Figure).

4.3. Results

4.3.1. Metal

Iron

A total of 8.41 kg of iron was recovered from all squares except C8, C9, K7, L7 (Table 2).

Approximately 426 g were recovered from the surface of 11 sq. The majority was amorphous iron, with some flat iron and spike fragments. However, in spit one, 7.1 kg of iron was recovered. The majority of this iron was amorphous, but spike fragments, nails and flat iron were also recovered.

An interesting occurrence of iron both on the surface and to a greater extent in the first spit, as that of modern sheet iron. This iron was badly corroded and fragmented, with the greatest occurrences being in squares L5 and K5.

Fragments of what might have been a barrel hoop (i.e. iron band) were recovered from

square I6, wedged around a rock.

Copper

Copper was recovered from 33 squares (137.5 g), approximately half of the excavated area. The majority of the copper was unidentifiable (amorphous), and to a lesser extent consisted of copper globules. Eight tacks or fragments thereof, comprised less than five grams (Table 2).

The largest amount of copper was located in square G3, and the majority of this was molten. This square also produced the largest amount of iron.

A copper coin was located in a rubble area of square G8. It is probably a token, possibly produced with royal permission from Louis XIV of France. From the researches of Mr Stan Wilson, Numismatist of the WA Maritime Museum, it is suggested that the token might have originated from Alsace Lorraine, land often in ownership dispute between France and Germany. This would account for the name Hans Weidingers on the reverse face. McCarthy (pers. comm.) feels that this token was a crew member's possession and might have been brought on land on the person of a crew member (Plate).

Lead

One square (D5), contained three articles of molten lead (3 g) in the first 20 cm of deposit.

4.3.2. Glass

Case bottle glass

Case bottle glass was recorded in 23 squares (163 g), and was the main type of glass recorded during the excavation. Case bottle glass was recovered from possibly undisturbed deposits in 11 squares. One area of occurrence might have been the result of a smashed bottle. The smashing probably occurred in square I6 or H6, and the debris scattered south, as only one fragment was recovered from square J6. Heavier and larger fragments of case bottle glass were found around square I6, and in decreasing size and weight in a fan of debris to the south and south-west.

Two fragments were recovered from the solution hole in square F9, at a depth of 90 cm. A decomposing cool drink can was also recovered from the solution hole, suggesting disturbance.

Clear Glass

Clear glass was noted on the surface of one square (E8), and during excavation 11 squares yielded clear glass. Nine of these square yielded clear glass which included pink, flat and curved glass, with some luminescence.

Approximately 32 fragments (11.2 g) were case bottle glass affected by exposure to ultra-violet light. Many of these fragments were recovered from the first 20 cm. Squares E5, E8 and C7 yielded fragments below this (Spits 2 and 3, 2 and 2 respectively).

Two squares (E6 and E4) yielded cubed glass which appears to be glass from a smashed windscreen! In the preliminary analysis these fragments have been described as modern. Square E4 yielded glass in spit one, whereas square E6 yielded cubed glass in spits two, three and four, but not in spit one.

4.3.3. Clay pipe

Clay pipe fragments were recovered from 17 squares (55 g), across an area 8 x 5 m (Table 2). Over 80 fragments of stem, and over 32 fragments of bulb and rim were recorded. The majority of fragments were recovered from the top 15 cm although in some squares (C4, C5, D4, D5, F7, G7, I5) fragments were recorded throughout the deposit.

4.3.4. Wood

Six squares recorded fragment of wood weighing a total of 15 g (Table 2).

4.3.5. Charcoal

Charcoal was recovered from over 50% (35) of excavated squares, weighing approximately 67 g (Table 2). Charcoal was not found in discrete layers but throughout the stratigraphy.

Charcoal was found in association with molten copper in 6 squares. Molten copper was also found in 2 squares which did not contain charcoal.

In 2 squares (C4 and C6), charcoal was present with 2 fragments of burnt clay pipe. In square D6 charcoal was present along with burnt wood fragments. Whereas, in square J5, no charcoal was recorded even though fragments of burnt shell were recovered.

One profile (Trench A), showed some stratigraphy including an ash layer of about 20 cm in length.

4.3.6. Slate

Seven squares recorded 44 slate fragments, weighing 15.6 g (Table 2). The fragments ranged in size from 10 mm to several centimetres in length. The majority of slate fragments were from slate boards, and no evidence of writing was recorded. However, the slate recovered from square C5, spit 3, were fragments of a slate pencil (28 mm and 22 mm in length).

4.3.7. Shell

Shell was recovered from 34 squares, and comprised the following species: limpet, whelk, oyster, chiton, abalone, land snails and fossil snails with a total weight of 710.4 g (Table 2). In contrast to the Breech Block site, the major shellfish in the site was limpet.

On commencing excavation there were no obvious surface concentrations of shell. In

the majority of squares, shells were recorded throughout the deposit, with a denser concentration in the lowset layer. This layer often consisted of limpet fragments amidst the limestone rubble, and was situated immediately above a compacted limestone base. With the assistance of Kate Morse it was realised that the deposit was mirrored in the Aboriginal shell midden deposits, that is, without the European layer. Consequently, the base layer of this site was that of an Aboriginal midden which has since yielded a radio-carbon date of 4630±87 years B.P. (Morse 1988:38).

Morse (1988) has identified the shellfish species present in the Cliff Top site (P5839) as the following main species:

limpets (Patella laticostata Blainville)

chiton (Acanthopleura hirtosa)

oyster (Saccostrea sp.)

whelk (Thais orbita Gmelin)

abalone (Haliotis roei Gray)

4.3.8. Disturbance artefacts

The following artefacts are modern and were located in the first few centimetres of the excavation: cartridge shells, paint, rubber and egg shell.

The cartridge remains were of 0.22 calibre bullets and were recovered from the very shallow deposits of squares H9, G9, F9 and deeper deposit of square F8. Five small modern cartridges and one large modern cartridge were recovered from these squares.

A rubber maker's tag from footware was recovered in spit 1 of square E8.

Squares F7 and E7 recorded paint fragments from the top 20 cm of deposit. The fragments were noted for square F7, as well as egg shell, and paper fragments, respectively. Egg shell was also recorded at a similar depth in square F9.

The modern artefactual remains have so far come from a localised area, that is, close to the remnant limestone cliff face which is the western boundary of the site. However, an

aluminium drink can ring pull top was located in the first few centimetres of deposit of square I5.

4.3.9. Other

Small amounts of artefacts have been recovered from the excavation which do not fall into any of the major categories of artefacts so far described. These include cork, leather and cloth (Table 2).

Cork

Four fragments of cork came from 4 squares and have a total weight of 19.3 g. From square H7, H6 and H4 the cork fragments were located in the first spit, but from square D5, the cork fragment was located in spit 3. These are not fragments of 'wine bottle' corks, but from a larger necked vessel, for example a large stoneware vessel. It is likely that these fragments came from the same cork.

Leather

One leather artefact was recorded in the first 10 cm of deposit, square E5. A leather shoe sole (104 g) was recovered intact. It was dry, cracked and slightly curled. the tack holes were visible around the edge of the sole. When recovered from the site, it was generally assumed that the artefact was Dutch.

Cloth

One small fragment of cloth was recovered from square E5 in the first spit. It was fragile, dry and cracked, and had no particular colour or pattern. The fragment might be cotton. This was the same square which yielded the leather shoe sole.

5. Discussion

5.1. Metal

According to Playford (1959) most of the artefacts from the wreck were located at the

foot of the cliff adjacent to the wreck site. At least 200 coins were located wedged in cracks and holes on the wave cut platform, and amongst limestone boulders at the base of the cliff. Other artefacts noted by Playford were: 8 bronze breech blocks found by Tom Pepper, coins, copper sheathing, belt buckles, a large pair of cannon ball callipers, a combination set square and scale, copper nails, conglomerations of iron which would have been nails, hooks, rings and barrel hoops (Playford, 1959:32).

In 1986, Duncan, a member of the WA Museum's maritime archaeological team, (pers. comm.) noted that fragments of possible barrel hoop, iron spikes and nail heads which appeared to have been excavated previously, were located around the rocks and beneath an overhang to the sea side of the Breech Block area excavation. Fragments of copper and copper nails, iron hoop fragments and whole or heads of iron spikes and nails were also ? and recovered.

Thus by 1986, all that remained of surface artefactual material from the wreck were primarily small fragments of metal and small glass fragments.

Metal was the main artefact group recorded from both excavation areas. Iron, copper, silver and lead artefacts were noted, with iron as the main metal type represented. McCarthy is undertaking further analysis of the material. The range of metal artefacts recovered from the land excavations of the Zuytdorp are similar to those recorded from the wreck site, and from the Zeewijk excavations (Ingleman-Sundberg, 1978 A and B; McCarthy, pers. comm.).

Iron

The distribution across the excavation areas does not suggest specific iron artefact concentrations, nor is there any evidence to suggest any downslope movement.

As the largest amount of iron in the excavations was amorphous, a comparison to the Zeewijk site is useful. At the Zeewijk site, ferrous material in the form of ships' fittings, weaponry and kitchen ware were recorded. It is likely that the considerable amount of amorphous iron at the Zuytdorp Cliffs sites might be similar to the Zeewijk iron complement. This will be the object of a study by McCarthy et al.

Copper

Most of the copper excavated at both sites was unidentifiable. Playford does not describe the occurrence of any copper material at the Cliff Top area, however he does record that copper sheathing was present possibly at the base of the cliffs during the 1950s (Playford, 1959:32/33).

Copper alloy nails or tacks were recorded at the Cliff Top site excavation. These artefacts were used, amongst other ways, in the fastening of copper sheathing to fittings, though not ship's hull, as a method of resisting the attack of the Teredo worm in warm waters (Staniforth, 1985:21-46).

However, after comparison with the Zeewijk artefacts, several other possibilities are obvious. Copper articles recovered from the Zeewijk camps consisted of buckles, fittings, cooking utensils and containers, and firearm components. Many of the copper articles were also unidentified (Ingleman-Sundber, 1978B).

It is interesting to note that the total copper component of the Cliff Top site is 110 g less than the concentrated Breech Block Area excavation. These results suggest that a fire most likely occurred at the Cliff Top site, and that perhaps more fires were made or sustained over a longer period at the Breech Block site. This suggestion stems from the likely connection of copper and timber.

Lead

A small amount of molten lead was recovered from one square at the Cliff Top site. Playford notes the occurrence of several rolls of lead at the Zuytdorp Cliff Top area. The rolls of lead were taken from the site by Tom Pepper, to make bullets, and may have weighed around 10 kg. Playford (1959:33) suggests that bullet manufacture was the original purpose of the lead rolls, and that they might have been part of the cargo to Batavia. The presence of the lead rolls on the top of the cliffs suggests the possibility that survivors made bullets from the lead and that the lead recorded during the excavation is debris from this activity.

One musket ball was located in a fireplace area of the Breech Block site. Over 400 musket balls of 17 mm, 15 mm, and 14 mm diameter were recorded from Gun Island Zeewijk camps (Ingelman-Sundberg, 1978A:99, 103). The occurrence of only one musket ball seems odd compared to the Zeewijk camp artefact assemblage, but might be explained as a result of 'treasure hunters'. It might also indicate the haste with which the ship was abandoned, or the severity of the wreck.

5.2. Glass

Although no glass was recovered from the Breech Block site excavation, Playford (1959:27) notes the occurrence of fragments at the base of the cliffs, presumably nearer

the wave cut platform. A fragment of spectacle glass was recorded during the 1986 WAM expedition (B. Duncan pers. comm.).

Case Gin Bottle glass was the main type of glass recorded during the Cliff Top area excavation, and areas of smashing appear in the pattern of artefact occurrence. In recent years this type of glass has been found scattered across the Cliff Top area. Positions have been noted by recent Maritime Archaeology expeditions.

Small piles of broken bottles were noted by Playford (1959:27) in the Cliff Top area immediately above the wreck site.

Amongst the clear glass recorded at the Cliff Top site, over 11 g have since been described as case gin bottle glass affected by exposure to ultra-violet light. Manganese was used as a decolouriser for green glass, and with subjection to ultra-violet light, case bottle glass may turn pink. These fragments therefore are probably pre-1950s and might be attributed to either Tom Pepper or the Dutch.

5.3. Clay pipe

At the Cliff Top site, clay pipe fragments were located in 8 squares. It is possible that more clay pipe fragments and other European artefacts have been transported outside the excavation area by wind and water. This is especially likely to the south of the site as a large number of clay pipe fragments occurred in the southern squares, possibly as a result of downslope movement.

Some clay pipe fragments were located in undisturbed deposits, such as those found in limestone solution holes, and around the rock in square I6. The evidence of stems with surrounding splinters, and of stems with fine roots through the centre suggests in situ material of considerable age of deposition, however there is doubt as to whether the deposition is attributable to the Dutch survivors.

No clay pipe fragments were recorded at the Breech Block area excavation. Playford (1959) notes that clay pipe fragments were located by previous expeditions, on both the wave cut platform, and on the cliff top. They have also been raised from the wreck site by current diving expeditions, cased in concretion. These are similar in shape and style to those recorded from the Zeewijk site (Ingelman-Sundberg, 1978A and B).

Clay pipes were used daily by both passengers and crew, and were perhaps part of the

cargo. Clay pipe fragments have been recorded several kilometres inland (D. Lamara, pers. comm.). The lack of fragments at the Breech Block site might be a result of early expedition collection strategy.

5.4. Wood and charcoal

A small amount of wood was recovered from both excavations and is little testimony to Playford's account of visible remains and fireplaces.

Playford (1959) made several references to wood. The most notable of these being the carved console support from the stern of the ship. Woodwork from the Zuytdorp was located on shore in the wreck site area and apparently at least one kilometre to the south. The majority of woodwork found by Playford was Baltic pine, with the exception of a few planks of oak (Playford, 1959:27).

It has been generally accepted (Playford, 1959:27/28) that artefacts which were found on top of the cliffs immediately above the wreck were carried there by the survivors. Playford also assumes that survivors would have lit a large fire, or signal fire in a small partly sheltered area which is the approximate site of the Cliff Top excavation. Playford (1959) does not mention whether wood was found on the surface of the area, or anywhere on the cliffs. He does however, presume that: '...all available wood, including chests...' would have been thrown on the fire.

To support this he noted that several centimetres below the sand (in the Cliff Top area) he found a layer of ashes which contained hinges, other parts of chests and globules of brass. The information gained by the excavation of the area would have been greatly enhanced by the presence of such an in situ deposit. Unfortunately, no such 'layer of ashes' was discovered during the current excavations.

Analysis of charcoal remains provides more evidence of fire and associations with heat affected material supporting Playford's description and suggesting that disturbance has occurred to the site.

The evidence of charcoal in the deposit tends to indicate a vague centring of fire activity. However, the paucity of fire affected material from these areas indicates gross disturbance which ha lead to the removal of this evidence. The extent of charcoal across the site might be attributed to wind scatter of fire remains, yet this does not provide an explanation for the presence of charcoal throughout the deposit.

Some explanation might be found in the history of the area inland from the cliffs which includes a tendancy towards bushfires covering massive areas of scrub and woodland. Ash from these fires has been known to travel many kilometres according to the prevailing winds. Therefore it is possible that a proportion of the ash in the deposit might be wind blown debris resulting from successive inland scrub fires.

The other possible explanation is that of disturbance to the site by other expeditions and 'treasure hunters' resulting in the churning up of the fire/European layer in search of artefacts, and thus spreading the charcoal throughout the deposit.

5.5. Slate

Playford (1959) does not record the presence of any form of slate in the area of the cliff base or wave cut platform. This lack of slate was mirrored in the Breech Block Area excavation.

However, on the cliff tops, fragments of a writing slate were noted (Playford, 1959:28), as well as fragments of one or more slates which were located en route to the barrel rung gully, about two and a half kilometres from the wreck site. The size and amount of slate present in the excavation area does not suggest that the majority of fragments are from one board.

5.6. Shell

Shell was recovered from both sites. As shell is a common coastal feature, the occurrence of shell in the sites was presumed. In the Zuytdorp Cliff area, shell beds occur on the wave cut platform. Empty shells have been noted amidst the sand at the base of the cliffs presumably from storm deposition. Shells have been noted on the cliff top usually in the form of middens - accumulations of shell, discarded after the flesh has been removed. These middens are attributed to the early Aboriginal inhabitants (Morse, 1988) of the area, and some are distinctly modern in appearance and are attributed to recent Abalone fishermen.

Knowing that an Aboriginal shell midden underlay the European material, the

occurrence of shell throughout the deposit and the fact that areas of the excavation were void of shells and/or the shell/rubble layer, must be explained. It is suggested that a general disturbance of the whole site by 'treasure hunters' over the years has contributed to the mixing of the midden contents throughout the overburden of deposit. It is also suggested that certain areas of the excavation are void of shells and/or the rubble layer because disturbance of the site has removed this layer or, it is remotely possible that some intra-site (midden) patterning is obvious.

The occurrence in the Breech Block site of small amounts of fossil snail, sand snails and barnacle, suggests natural deposition of material. Chitons may also be looked upon as a food source, and are found a short distance away on the wave cut platform, along with limpet, oyster, mussels, barnacles and nerites.

5.7. Other

As a matter of comparison, the leather remains from the land excavations of the Zeewijk wreck come to eight fragments from 342 one metre square test pits excavate at 10 m intervals (Ingelman-Sundberg, 1978B:23). No cork was recovered. The only material recovered was one fragment of rope. It may be sheer coincidence that fragile artefacts such as cloth and leather, were recovered from the same square and depth of deposit, a depth which is generally assumed to be a recent deposit considering the wind patterns and sand movement of the area.

5.8. Disturbance evidence

Disturbance is indicated by:

1. squares which have no evidence of a midden/base layer above the limestone.

2. shells present throughout the deposit in substantial amounts.

3. modern artefactual material which has been located in other than the surface deposit, or spit one.

Disturbance can be defined here as primarily human or mechanical disturbance which has altered the original deposition of artefactual material at the time of, or soon after, the wreck of the Zuytdorp and thus has resulted in movement of material and/or removal of artefacts.

Disturbance secondly can be defined as natural disturbance, that is, movement of artefactual material through water or wind action.

Types of material found during the excavations which are not thought to be of Dutch origin are cartridge shells, paint, rubber, egg shell and cubed glass.

As these artefacts have not been located at depths below the first spit, let alone the first few centimetres of deposit, it is possible that these were the result of visits to the area by unknown groups of people. The presence of these artefacts at the upper layer of deposit does not immediately imply disturbance of the deposit as a whole, but might suggest disturbance of the site to some extent. The originators of this material have visited the site, no doubt picked up and/or collected material from the surface, and might have scraped around the surface deposits looking for more interesting material.

The presence of paper, paint and egg shell suggest a stay (camping) at the site. There is ample evidence on the cliff top area of 'modern middens' left by Abalone divers and fishermen, as well as fire places (Carpenter, Duncan and McCarthy, pers. comm.). In fact, about 10 m from the excavation area, on a ledge running seaward of the remnant limestone cliff face, the remains of fireplaces were noted by WAM staff (pers. comm. 1987) in 1986. The depth that these 'modern' artefacts were located during this excavation might be due simply to wind and sand movement.

However, squares where the midden and limestone rubble are missing could be seen as disturbance evidence, coupled with the fact that shells have been recorded throughout the archaeological deposit. also, the pattern of clay pipe occurrence across the Cliff Top excavation site suggests disturbance and collection of artefacts in certain areas.

Square I5 for example, has modern artefacts throughout the deposit, mixed with shipwreck artefacts. And in square F9, at approximately 1 m in depth in a limestone solution hole, a decomposing can was revealed. The presence of case bottle glass in the deposit above the can suggests back fill of the hole.

In the Breech Block area, disturbance was revealed in the form of pick marks on the compacted limestone base of the site. These pick marks were obviously from some earlier visit, whether it be the Dutch survivors or 'treasure hunters'.

1. To determine the extent of in situ European artefacts. This aim is linked closely with that of number 3 (to determine the degree of disturbance of the main concentrations of

European material, and whether this disturbance could be attributed to human or natural causes).

From the results of these excavations, a large degree of disturbance has occurred. This disturbance can be recognised in several ways, such as the presence of modern European artefacts throughout the deposit or beneath Dutch artefacts in several areas, the lack of material in some squares, the presence of the Aboriginal shell midden throughout the deposit, and the presence of unknown pick marks on the base layer of the Breech Block excavation. It is the belief of the author that there are certain areas of the Cliff Top site which are fairly intact as shown by discrete layers of clay pipe or Case Gin Bottle fragments. At the Breech Block site, the presence of a discrete layer of ash albeit a small area, contributes to the idea of some intact deposit.

The majority of disturbance can be attributed to human interference of the site, searching for artefacts. A great deal of disturbance to the site can be recognised when comparing the accounts of Playford and the site pre-excavation in 1987. However, disturbance attributable to natural causes can also be suggested. The high degree of wind scour and deposit of fine sand across the site has contributed to the exposure and protection of many fine artefacts. Those which were located during this excavation had either not been visible or had been discarded by previous artefact hunters.

2. To determine the main concentrations of European material and whether the surface observations were reflected in the archaeological record.

The main concentrations of European material in the vicinity of the wreck site were identified through the archaeological record. However, at the Cliff Top site, it was felt that European artefactual material might have been present outside the excavation area to the south along the cliff line, or to the west towards the cliff edge. It was not felt however, that these deposits contained major concentrations of European material.

Surface observations were reflected in the archaeological deposit in so far as European artefacts, for example iron ,were reflected in the deposit with a similar density of iron fragments. These instances were however, in shallow deposits, and suggested that the iron was possibly sheet iron.

4. To compare the evidence recorded in Playford (1959) of occurrences of artefactual material (e.g. breech blocks), and subsurface observations (e.g. fire places), with the evidence revealed through excavation.

The comparison of Playford's work with that of the current site shows that the sits have changed vastly. In the areas where Playford describes the presence of major artefacts, the current sites do show surface occurrences of fragmented artefacts.

The most absent of Playford's subsurface observations as revealed through the current excavations was that of the fireplaces. Playford noted the occurrence of fireplaces at both sites, with several noted particularly on the cliff top. Very small evidence of the fires remained to be found during the excavations, and this evidence does not attest to the degree of Playford's descriptions, only to the presence of some fireplaces. The amount of disturbance to these sites has taken away an important resource which could have aided this project in answering the question of 'who made the fires?'. This knowledge could have helped to answer the question of the survival of the people aboard the Zuytdorp , or pointed towards the Aboriginal inhabitants of the area as the originators of the fireplaces.

5. To provide archaeological evidence to compliment research undertaken in the wreck of the Zuytdorp .

One of the results of these excavations is that the artefact component does compliment the artefacts raised from the ship wreck site, and similarities between artefacts from this wreck site area have been found with ship's fastenings, clay pipes and glass to name a few artefact groups.

As no coins have been recovered from the land excavations which compare with the wreck site coins, the recovery of a token st the Cliff Top site suggested its origin as a crew's possession and might have been in the clothing of a member of the crew when the ship struck. This token has not been recovered from the wreck site, and thus adds a small piece of information on the story of the Zuytdorp .

6. CONCLUSION

There is considerable variation in the range of artefacts present at each site. The more exotic and the greatest range of artefacts were located in the archaeological deposits of the Cliff Top site. Both sites show indications of gross disturbance to the archaeological deposit. However, both sites have evidence to support the descriptions of Playford regarding the presence of 'fireplaces', and the range of artefacts which he described as present during his expeditions.

From the results of these excavations it is clear there has been great disturbance of all visible remains and little if any recording of same prior to 1986. Thus the fate of the Zuytdorp people and possible survivors of the wreckage, cannot be adequately considered nor answered on the basis of the known remaining evidence. So little of the sites have been left untouched by previous visitors searching for artefacts, that the integrity of the archaeological context has been significantly altered.

RECOMMENDATIONS

It is recommended that further site survey be conducted of the land adjacent intermittent water courses, for any in situ material.

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