WRECK INSPECTION REPORT: Ningaloo MID–19TH CENTURY UNIDENTIFIED

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Jeremy Green excavating a Pintle

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Technical Data

Site Name: Ningaloo 19th century Unidentified **Date lost:** Unknown

Date of Inspection: 28/4/2004 1st inspection to find location
1/5/2004 2nd inspection beginning of site plan

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Approximate Location: Ningaloo Reef, 8Nm south east of Point Cloates.

GPS: See Lat. And Long below **Datum:** WGS 84

Chart No: AUS 745 **Lat**: 22°51.8S **Long**: 113°45.E

File No: MA 357/04 **File Name**: Ningaloo Reef Unidentified

Sailing Directions: From Pt. Cloates proceed on the inside of the reef on a south easterly course for about 8nm, then turn out to sea, through a passage in the reef marked by prominent rockheads. The site is located on the outside of the reef about half way along where the reef extends more east west than north south.

Site Photographs:
Black & White: Stereo images
Colour Digital and film
Transit Photos: Yes
Video: Yes

Site Conditions on inspection
Sea and Swell: 1 – 1.5m swell. Morning Easterly breeze approximately 15 knots turning onshore around 2pm.
Surge: Significant amount of surge dependant on swell. Increased closer to the reef. Not as prominent as the *Correio da Azia* site.
Visibility: Ranged from 10m to 15m
Current: Nil
Sea-bed coverage: Limestone reef substrate. Quite high profiled ridges with gutters in between, running perpendicular to the reef.

Chemical Measurements :
Temperature: Not taken
Salinity: Not taken
Ph: Not taken
Dissolved O_2: Not taken
Corrosion Potentials: Not taken

Biological Data: Colonising fauna: Some coral growth on the site. Hard and soft corals dying off closer to where the reef meets the surface. Varying array of fish life. Aside from this it is quite barren.

Site Condition and Integrity:
The site is in a high energy environment. This site type precludes there being much, if any, remaining organic material. All artifacts discovered during the survey and recovery, were inorganic composition. The proximity of the site to the reef, mobile sands and dynamic sea state all contribute to the further degradation of exposed artifacts.

Management considerations :
(i) Natural forces: The concretion is comparatively hard and has cemented iron artifacts to the bottom securely. Loose artifacts are subject to being lost by heavy seas as well as being threatened by the abrading effect of the sand scouring across the site. The site is not in deep water and is located at the edge of a reef platform: it is such a dynamic site that the same conditions dominate the year round.

The site as mentioned above is in a high energy environment. This site is subject to heavy wind, wave and swell actions. High energy environments can be very detrimental to exposed wrecks and the remaining artifacts. The site provides highly oxygenated water, and if relatively shallow there is a high level of light penetration. When there is an increase in a variable reactions occur quicker in the environment. An increase in light could influence a faster rate of growth of the marine biota. Combine this with a high level of dissolved oxygen and there will be an increase of reaction for the artifacts remaining:

> When metals are placed in oxygenated seawater they will corrode. Positively charged ions are produced as the metal oxidises and precipitated in the surrounding concretions or disperse in the sea. Each metal corrodes at a rate that depends on variables such as temperature, dissolved oxygen, salinity, water movement and the inherent reactivity of the metal in relation to water (MacLeod *et al*, n.d.).

After the vessel wrecked it would have been subject to a number of post depositional processes. The vessels organic and loose materials (unless they were sufficiently heavy) would have, either have been destroyed by the conditions; carried away as flotsam or degraded quickly.

Both copper and iron (which are the dominate remaining materials at the site) are subject to increased corrosion; despite the marine accretions they have. Iron forms a concretion (marine biota accretion) whilst copper tends to have limited accretion (as copper is toxic in the marine environment):

> It has been noted that iron objects after significant time immersed in saline water begin to deteriorate significantly at first then at a decreasing rate but never stops. In a high energy environment that is highly oxygenated this reaction occurs more significantly (North, 1976).

Therefore it is established that though the remaining artifacts either have a concretion layer or are toxic in the marine environment, they are still subject to corrosion. As a high energy site this process is increased dramatically with the artifacts are experiencing high levels of corrosion.

(ii) Present and future human forces: Despite the difficulties in accessing this area. This site is likely to attract

the amateur diver: as it is a new discovery. During the inspection of the site all visible loose artifacts at risk were removed. Material that remains is either very large, heavy and/or concreted into the reef itself, making removal difficult. There is no evidence of diver interference on the site. The significant amount of loose cultural remains helps verify this.

(iii) Projected General site stability: Even though the site lies in a high energy environment that has potentially damaging effects, the cultural materials that remains is heavy and either have concretion or are biologically toxic. Some of the cultural remains have accreted a hard calcareous layer that helps to preserve them. However the concretion does not stop corrosion occurring it only decreases the rate it occurs.

> The *Lively* [[shipwreck] experiment…since the mean sea water temperature is 25.4±1.6°C, the long period of immersion, *c*. 160 years, combined with the well oxygenated nature of the site…produced good conditions for corrosion (MacLeod, 1987).

Most loose artifacts have been removed from the site but the material that remains is still ‘at risk’.

Chart Excerpt showing access to Site:

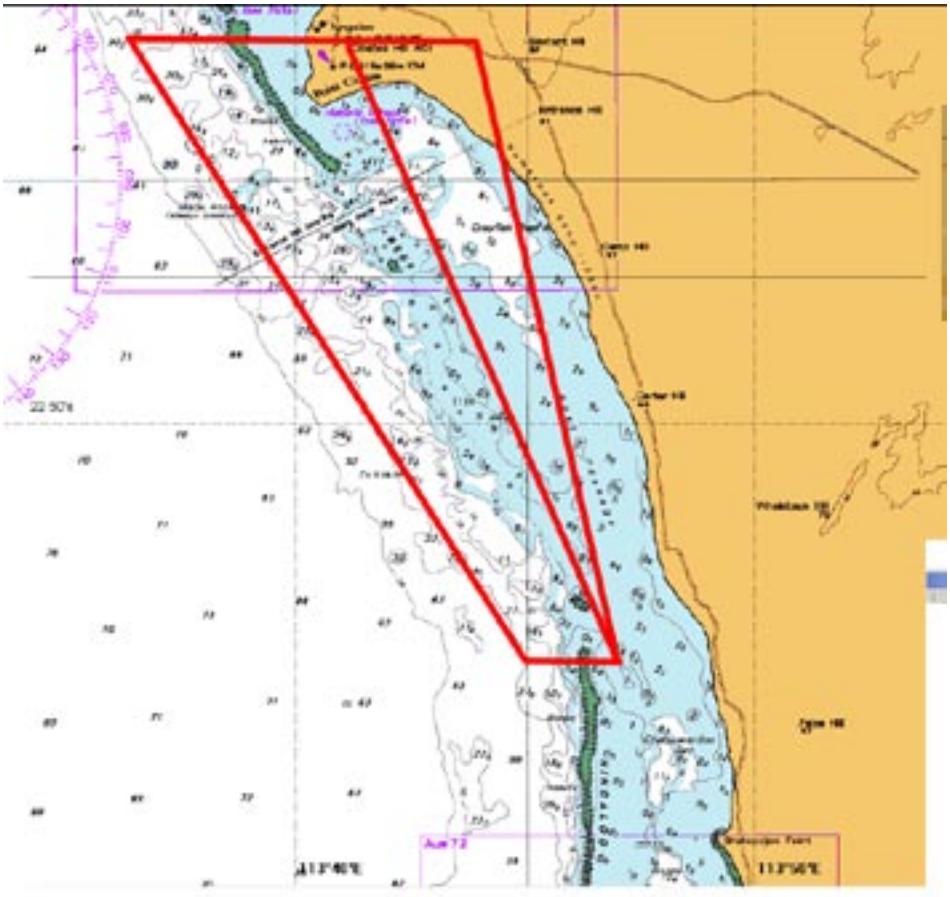

Figure 2. Chart excerpt from AUS 745; showing the area of Fugros survey

Figure 4. Location of wreck site on the reef

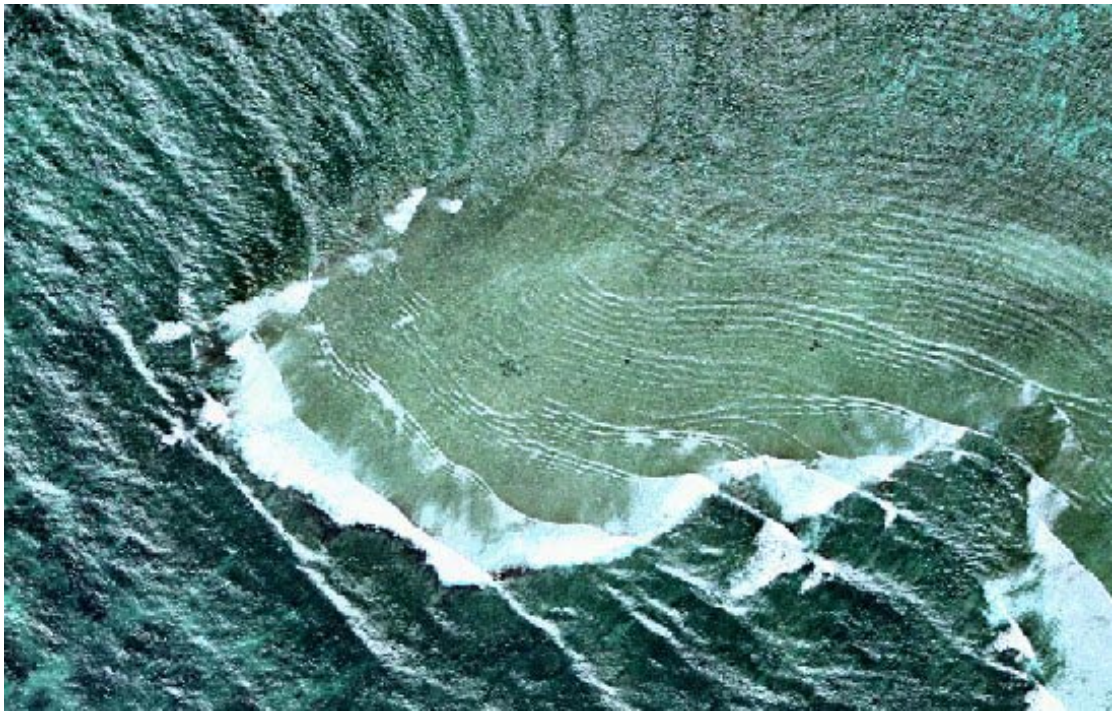

Figure 5. Close up of reef section

Description of Site

Figure 6. 19th Century Unidentified terrain

Figure 7. 19th Century Unidentified terrain

Figure 8. Anchor at the 19th Century Unidentified site

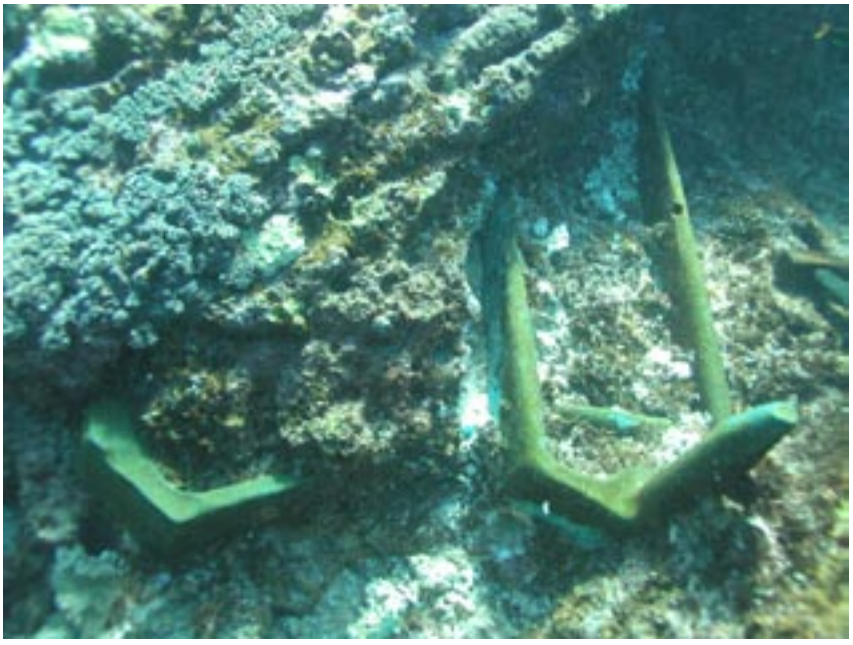

Figure 9. Two of the concreted pintles

The 19th century Unidentified site lies on the Ningaloo Reef south west of Point Cloates. The site is approximately 40 metres wide by 30 metres long. There are scattered artifact remains across it consisting of heavier items (anchors and rudder fittings) and lighter scattered or concreted fittings. Further artifacts may be present in the mobile sediment that dominates the gutters in the reef. There is a windlass (near the reef top) four anchors: two large iron stocked anchors (one with the stock broken); one stockless anchor ; a small iron stocked anchor; an iron knee; pintles, gudgeons and other fittings concreted into the reef. Some material was removed for diagnostic purposes.

Anchors: Four anchors are located at the site. These anchors could provide us with information regarding the period of their use when examining style and their manufacturing techniques. The anchors are admiralty pattern anchors with curved arms. This curvature of the arms is significant because designs of older admiralty anchors during the mid 16th–18th century's had straight arms. There was a shift from these old 'Admiralty Longshank Anchors' (that had a long shank and straight arms) in the late 18th century to the new 'Admiralty Pattern Anchor' (that had a shorter shank, curved arms and a new process for forging) in the 19th century. The curvature of the arms and the new manufacturing techniques were in response to the large amount of

Longshank anchors that were shearing at the crown. In the period 1809–1812 approximately 350 were repaired and 150 were still outstanding (Curryer, 1999).

Coal: In one of the gudgeons there is a piece of coal lodged into the recess where the pintle fits. The origin of the coal can possibly be determined via speciation analysis, which can provide information relating to the vessels origin or trading route. Speciation or palynological analysis, analyses the plant microfossils contained in coal. These microfossils are indicative a specific geographical zone. Once the zone is known this can be corresponded to coalfields with the same microfossils, determining an origin of the coal (McCarthy, 1980; Richards, pers. comm., 2004).

Fastenings: Gudgeons, pintles and the other fastenings of the vessel can all help determine a size for a vessel. By the 19th century there were strict standards for the construction of sea going vessels. Since the vessel is attributed to the mid to late 19th century we can extrapolate these fastening sizes to determine the vessels tonnage (400 plus tons) and size. Using the fitting sizes from Lloyds this can produce a result that is based on a standard for the time period (Desmond, 1919; Australian Lloyds, 1864).

Sheathing: A sample of the hull sheathing was retrieved from the site to assist with dating the vessel. Sheathing was used on a vessels hull to discourage marine biota from attaching itself. Since copper is toxic in the marine environment: both copper and alloys of copper were used to sheath hulls. G. F. Muntz took out a patent for a new copper-zinc alloy in 1832-1846. Muntz metal (termed yellow metal from its colour) however was used for a considerably longer time frame. If the sheathing from the vessel (after analysis) is in fact ‘Muntz metal’ then it will date post date 1832. Muntz metal was still used until the advent of iron shipping in the late 19th century. This dating could further be established from the fastenings. If the metal is not Muntz then it most likely predates 1832.

Windlass: The windlass at the site would most likely be like the one below, all that remains today are the rims, the warping heads and the windlass rod. All the wood fittings have degraded and washed away. It would be also expected that the strongback assembly should be evident at the site.

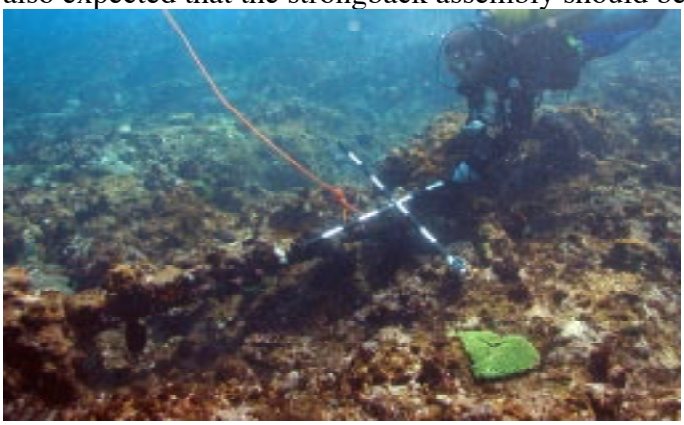

Figure 10. Windlass from the 19th Century site **Plan of Site**

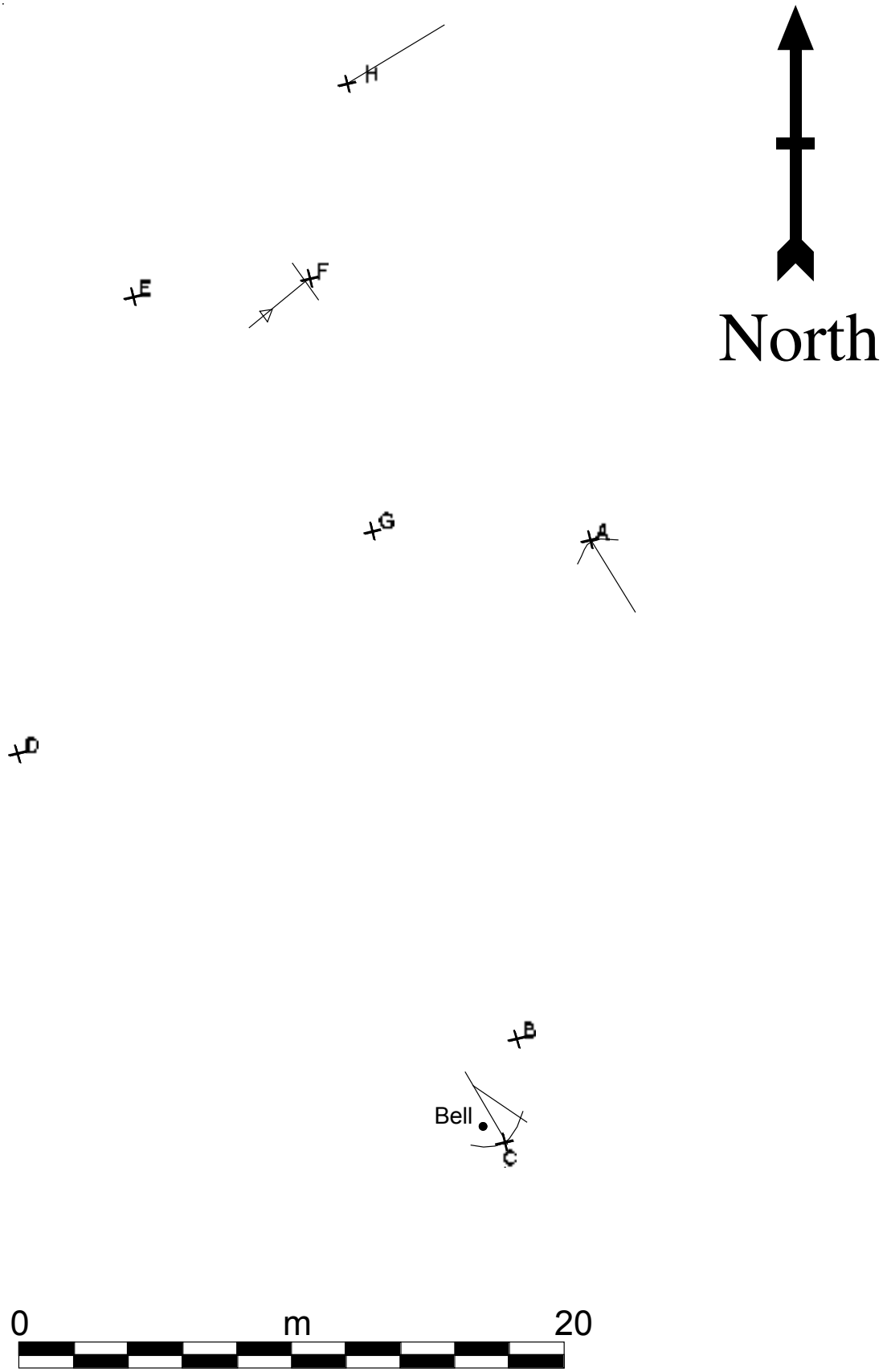

Figure 11. Plan of the 19th Century Unidentified site

Material Raised

NRU1	glass decanter(?) stopper top	Located in sand crevice 7m north of point A (stockless anchor) 29 April 04
NRU2	1 copper alloy piece of metal-tank?	40 m due west of main wreckage 29 possibly from a water April 04
NRU3	Tack	Under bell 4 May 04
NRU4	Tack	Under Bell 4 May 04
NRU5	Metal piece	Under Bell 4 May 04
NRU6	Bolt	Surface collection 4 May 04
NRU7	Bolt/rove	Surface collection 4 May 04
NRU8	Bolt	Surface collection 4 May 04
NRU9	Fastening	Surface collection 4 May 04
NRU10	Fastening/bolt	Surface collection 4 May 04
NRU11	Fastening/bolt	Surface collection 4 May 04
NRU12	Fastening/bolt	Surface collection 4 May 04
NRU13	Fastening/bolt	Surface collection 4 May 04
NRU14	Sheathing	sample from sheathing between A and B 4 May 04
NRU15	Fastening, curved	10m WSW of anchor C 4 May 04
NRU16	Sheathing	10m WSW of anchor C 4 May 04
NRU17	Fastening	10m WSW of anchor C 4 May 04
NRU18	Fastening	10m WSW of anchor C 4 May 04
NRU19	Fastening	10m WSW of anchor C 4 May 04
NRU20	Fastening	10m WSW of anchor C 4 May 04
NRU21	Fastening	15-20m W of anchor C 4 May 04
NRU22	Fastening, nail	15-20m W of anchor C 4 May 04
NRU23	Fastening, nail	15-20m W of anchor C 4 May 04
NRU24	Fastening, nail	15-20m W of anchor C 4 May 04

NRU25	Bolt	15-20m W of anchor C	4 May 04
NRU26	Bolt, curved	15-20m W of anchor C	4 May 04
NRU27	Concretions one with lead	Surface collection near pintle/gudgeon E	4 May 04
NRU28	Coal?	Surface collection near pintle/gudgeon E	4 May 04
NRU29	Fastening unidentified	Surface collection near pintle/gudgeon E	4 May 04
NRU30	Fastening (sheathing nail?)	Surface collection 10 NW of anchor C	4 May 04
NRU31	Pintle/gudgeon	From pintle/gudgeon area D	4 May 04
NRU32	Gudgeon	On reef top platform approx. 40m from windlass	4 May 04
NRU33	Pintle	Area D	4 May 04
NRU34	Ships Bell	Next to fluke on anchor C	4 May 04

Site Identification Comments

The Point Cloates region is an area that has been dangerous for shipping in the past. In the case of the *Correio da Azia* this was partly due to map error. Charts of the region were actually based on those de Vlamingh produced in the late 17th century. While more recent charts were available, namely those of Flinders and de Freycinet; neither of these explorers had charted this part of the Australian coast, as the Portuguese and many others had thought. There are 21 wrecks in the Point Cloates region, evidencing the high risk nature of the area. The wreck of the Ningaloo Reef Unidentified has been ascribed (from the archaeological evidence) an approximate tonnage of 400 plus tons. This tonnage can be used to infer: with the use of G. Hendersons *Unfinished Voyages* and the WAMM Shipwreck Database what vessel this may have been:

***Occator*:**

> The brigantine *Occator* sailed out of Melbourne on 12 January 1856 bound for North West Cape…At 4 p.m. on 4 February, Captain Place estimated that he was 80 kilometres west of the Cape, so he tacked east in rough seas but light winds…The captain said he expected to see land in the morning at 20–25 kilometres' distance. At about 3 a.m., however, the mate called out 'put the helm hard down', and called the captain. Place came on deck at once, and seeing the vessel in stays, gave orders to haul the yards round. The order was executed promptly, but as the vessel was paying off, her heel caught on the rocks, and the surf was running so high that a heavy sea broke over the vessel and threw her right onto the reef. Shortly after, the rudder was unshipped, and the ballast was found to be covered with the rising water…The wreck of the *Occator* has not been found in modern times. Contemporary reports indicate that the vessel struck between 48 and 64 kilometres south of the Cape, which would place it in the region of Carbaddaman Passage (Henderson, 1988:29-31).

***Unidentified*:**

> …revived in 1876 by Charles Tuckey who claimed the an Aborigine from a North West Cape tribe had told him the following story:
>
> A long time ago (about ten years as he described) a ship was wrecked North West Cape; the passengers landed, at night, in the boats, and as they had no means of defending themselves the natives had no difficulty in making them prisoners. There was a large number of persons, and amongst them were some females [no women are listed among the *Emma's* passengers]. The natives were not 'sulky' with them, but nevertheless they killed and ate all of them, the narrator partaking of some of the flesh (Henderson, 1988:70).

The above passages are taken from G. Henderson's *Unfinished Voyages: 1851–1880*. The first reference appears to be the more unlikely as the vessel may have wrecked too far to the north. The second reference listed under the *Emma* is the more likely of the two. Since the *Emma* was not carrying female passengers it can be established (with its tonnage) that this vessel mentioned in the passage was not the *Emma* but some other unidentified vessel. Both of the above vessels comply with the approximate size determined for the vessel using the specifications set out in Lloyds register. There are no other shipwrecks currently listed in *Unfinished Voyages*. However in the Western Australian Maritime Museums Shipwreck Database there could be some possibilities (see Appendix C).

Wreck-Site History

((i) Contemporary Salvage: There is no significant evidence to suggest contemporary salvage. There is wreck material present but if contemporary salvage was to have taken place it could have been of the ships cargo or personal possessions (although these could have washed away). Also ships fastenings or scantlings could have been salvaged.

(ii) When found in modern times and by whom: Located as an anomaly by Fugro's survey with an aerial magnetometer. Identified and inspected by the Department of Maritime Archaeology.

(iii) Modern Salvage: Nil. Artefacts were plotted and recovered by Department of Maritime Archaeology.

(iv) Casual Diver interference, if any: This is hard to determine or rule out. Since the invention of the aqualung modern divers have been able to scour the seabed in all sorts of environments andit is possible that there has been diver interference. However since this discovery (with the *Correio da Azia*) represents a new find then it is entirely plausible that this site has not been disturbed since its wrecking.

(v) Modern diver use, if any: Nil.

Assessment of Site Significance

(i) Archaeological: The 19th century site is archaeological significant from its potential to illustrate an aspect of colonial trade during that time period. Through its archaeological and historical investigation the nature and identity of the wrecked vessel can be brought to light.

(ii) Technological: This vessel does not appear to be more significant in its technology compared with other vessels of a similar age. If indeed the fastenings are Muntz metal then it is indicative of the era rather than innovative.

(iii) Scientific: This site is significant because is located in a high energy environment and can offer us more information on ship disintegration and the effect of micro-environments similar to this wreck site deterioration.

(iv) Educational: Significant in its potential to inform the public of current archaeological (and conservation) techniques through exhibition and lectures. There is also potential for the inclusion of volunteers in the project or field.

(v) Recreational: It is not very significant as an area of recreation for the general public. It is subject to high wave and swell action. It would not be recommended to dive this site unless the divers were experienced in the conditions.

(vi) Cultural: Significant due to the coal it may have had as its cargo (coal found in a gudgeon). This could be a direct link to trade with the colony. Its significance is a direct result of this.

Management Proposals

Since the vessel has been attributed to the 19th century and is in Commonwealth waters, it is automatically afforded protection under the Historic Shipwrecks Act 1976. Immediate management of the site should preclude visitation by and promotion to the general public until further investigation has been carried out to identify the vessel. At the completion of this projected work, a plan of interpretation for the public should be initiated, in conjunction with CALM and other stakeholders of Ningaloo Reef.

Recommended Research Program

1. Archival research. A thorough examination of losses in the Exmouth region and associated documentary sources needs to be undertaken to determine the range of ships was lost on Ningaloo.

2. Artefact analyses to assist in identification of vessel. Including chemical composition analyses of the coal to identify source and subsequently, potential voyage route; analysis of sheathing samples to help determine a date range for hull construction; examination and research of fastenings including gudgeon and pintles to estimate size and age of vessel.

3. Comparative Studies. To assist in identification of vessel a number of fittings from comparable sites and collections should be selected for analysis.

4. Reinvestigation of site to:

a) Further survey and identification of primary site, including potential excavation.
b) Recovery of further material for diagnostic purposes (e.g. pintle and gudgeon which are partially excavated).
c) Initiate a bathymetric survey to ascertain the process of wrecking and extent of site.
d) Initiate *in situ* conservation project to monitor long-term stability of site.

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Appendix A: *Emma* Excerpt

Appendix B: Excerpts from Lloyds Register for Fittings

Windlass similar to on site (after Tryckare)

Appendix C: WA Museum shipwreck database excerpts