POLICE NATIONAL DIVE SQUAD

EXAMINATION OF DIVING EQUIPMENT USED DURING THE DEATH OF

Dr Lailade OSUNSADE
2 May 2013

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1. OBJECTIVES

1.1. The objective of this report is to determine any causative factors present in this diving death and identify any recommendations relating to Safe Diving Practices.

1.2. The determination of these factors is based on the following information:

- Equipment examination by Police and experts
- Photographs taken of the equipment
- Jobsheets and statements obtained from witnesses

1.3. This report will not include any recommendations regarding criminal liability or possible charges.

1.4. This report was commissioned as per Police Manual of Practice, and previous Police Instructions.

1.5. This report has been prepared for the New Zealand Coroner and a copy made available to the Vanuatu Police.

2. EXECUTIVE SUMMARY

2.1. The findings of this report conclude that:

2.1.1. Some components of the dive equipment have contributed to the death of Dr OSUNSADE.

2.1.2. Some items of equipment were in need of service

2.1.3. The contents of the dive cylinder used by Dr OSUNSADE did not meet air purity standards

2.1.4. The interior of the dive cylinder used by Dr OSUNSADE contained foreign material.

2.1.5. I believe that Dr OSUNSADE was excessively over-weighted.

2.1.6. I believe that recommended safe dive practices have been exceeded.

2.1.7. I believe that Dr OSUNSADE has become separated from her dive guide inside the wreck of the SS President Coolidge, losing vital pieces of equipment, and has drowned.

3. INTRODUCTION

3.1. This report covers the examination and testing of dive equipment that was being used by Dr Lailade OSUNSADE at the time of her death on Thursday 2 May 2013.

3.2. The report also comments on aspects relating to diving activities surrounding her death.

3.3. At the time of her death, Dr OSUNSADE was a 34-year-old female who was a resident of New Zealand, and had travelled to Vanuatu for a diving holiday.

3.4. Prior to immigrating to New Zealand, Dr OSUNSADE was residing in the United States of America.

3.5. At the time of her death, Dr OSUNSADE was diving on the wreck of the SS President Coolidge, which is located at Santo Island, Vanuatu.

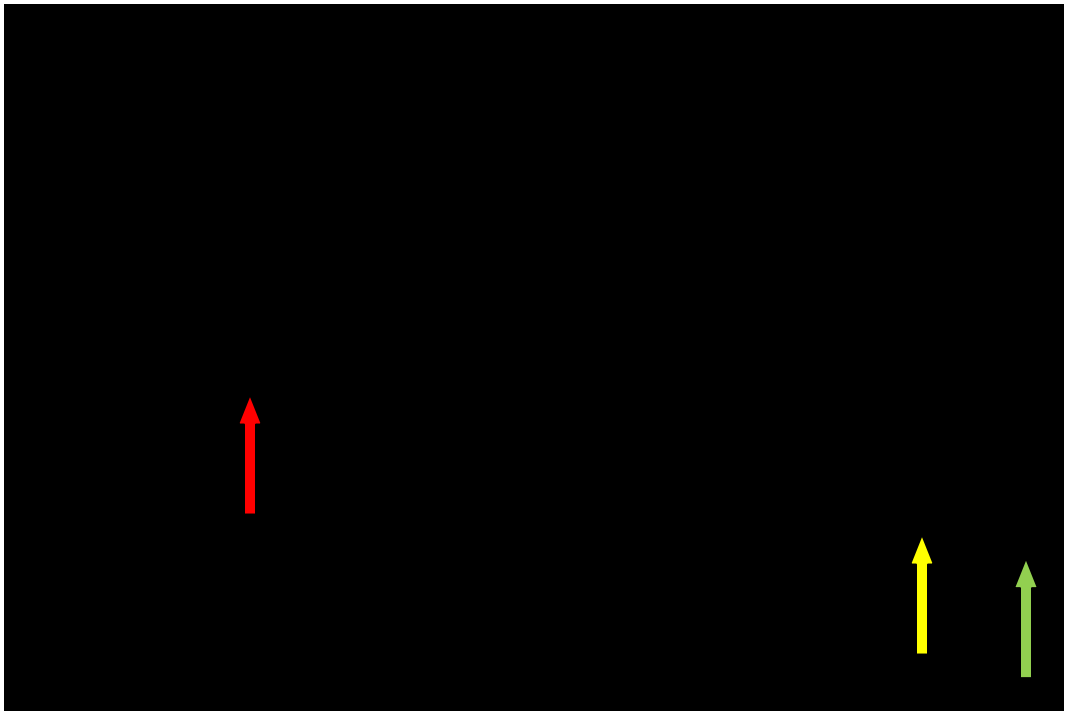


Photo 1: Location map

Red arrow indicates approximate location of Espiritu Hotel.
Yellow arrow indicates area of first dive - SS President Coolidge
Green arrow indicates Million Dollar Point.

3.6. The wreck of the SS President Coolidge, is situated within a very short distance of the shoreline. The bow of the SS President Coolidge is at a depth of 20 metres, and the stern is at a depth of 70 metres if you are on the sea floor.

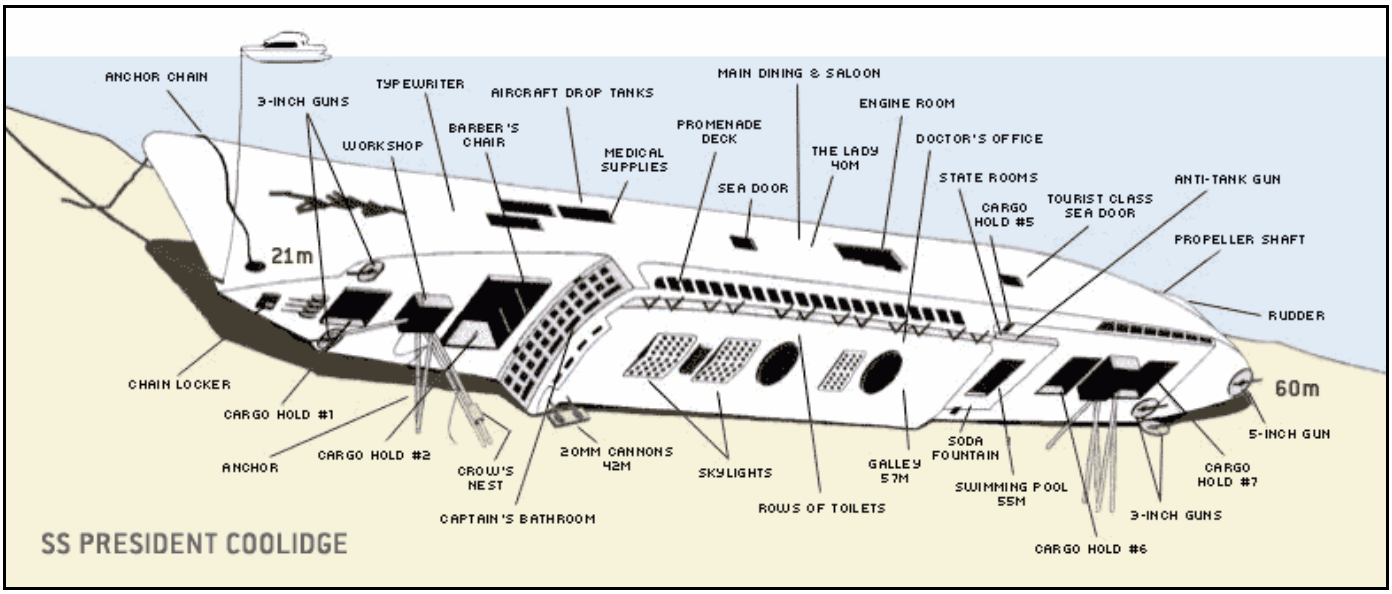


Figure 1: Diagram of SS President Coolidge

3.7. The depth of the fatal dive was forty two metres and Dr OSUNSADE was on a one-on-one guided dive. Her dive guide was Mr Simon TOA from Aquamarine.

3.8. In March 2014, as a member of the New Zealand Police National Dive Squad (PNDS), I travelled to Vanuatu to examine and seize the dive equipment used on the fatal dive.

3.9. Whilst in Vanuatu, I interviewed Aquamarine staff and other dive operators who attended the scene.

4. CIRCUMSTANCES

4.1. On Saturday 27 April 2013, Dr OSUNSADE flew from Auckland to Port Vila, then onto Espiritu Santo, Vanuatu.

Figure 2: Map of Vanuatu

4.2. Espiritu Santo is one of the northern islands, part of a chain of islands making up Vanuatu, and takes 45 minutes to reach in an ATR aircraft from Port Vila.

4.3. Dr OSUNSADE booked into the Espiritu Hotel on 27 April 2013.

4.4. According to the owner of Aquamarine, Mr Rehan SYED, Dr OSUNSADE made a walk-in booking to dive with Aquamarine on Monday 29 April 2013.

4.5. Mr SYED assisted Dr OSUNSADE with the necessary Liability and Assumption of Risk forms, and during this time, Mr SYED states he checked Dr OSUNSADE's diving certification.

4.6. During this time, Dr OSUNSADE was sized up for rental gear required for diving.

4.7. When Mr SYED was interviewed in March 2014, he stated that Dr OSUNSADE started diving on Tuesday 30 April 2013.

4.8. However, according to Dr OSUNSADE's dive computer and logbook, she completed one dive on Monday 29 April 2013, to a depth of 33.8 metres.

4.9. From interviews with Aquamarine staff, I believe Dr OSUNSADE was guided by Mr David TONY on this dive on 29 April 2013.

4.10. On the morning of Tuesday 30 April 2013 at about 8:30am, Dr OSUNSADE was picked up from her hotel by staff from Aquamarine, and taken to the dive site of the SS President Coolidge.

4.11. Dr OSUNSADE completed a dive to a depth of 33.1 metres. This was to the front Cargo Holds, on the SS President Coolidge.

4.12. During this dive, Dr OSUNSADE was guided by Mr Simon TOA (Aquamarine guide), and another tourist present on this dive was Mr Robert KENT.

4.13. Mr KENT had with him an underwater video camera, which he used to record several short segments of that dive.

4.14. The first video segment of 49 seconds shows Dr OSUNSADE finning in a bicycle motion, almost vertical in the water (which is not an effective means to fin through the water), and indicates someone is either an inexperienced diver, over weighted and/or is outside their comfort zone during a dive. During this short segment, Mr TOA swims over to Dr OSUNSADE and she shows Mr TOA her Submersible Pressure Gauge (SPG) but the video camera moved away from Dr OSUNSADE to look towards the bow gun before the clip ends.

Comment: Buoyancy/Weight

4.15. Testing conducted by PNDS has proven Dr OSUNSADE was severely over weighted, and this has caused her to work hard underwater, thus why Dr OSUNSADE's breathing rate is very high. Refer to Section 5.18 Weight Belt - for further information.

4.16. Being over weighted, along with a fast breathing rate, will reduce the cylinder contents rapidly.

4.17. The next video clip supplied to me by Mr KENT is 32 seconds long and again has been taken by himself.

4.18. This video clip shows Mr TOA leading the group out of the front Cargo Holds. Dr OSUNSADE is following Mr TOA, and Mr KENT is following up in the rear. Again Dr OSUNSADE's breathing is rapid.

4.19. At one of the decompression stops, Dr OSUNSADE had to be given a spare dive cylinder that was either carried by Mr TOA, or that had been positioned in a location handy to himself and the group in the event someone in the group ran low on or out of air.

Photo 2: Dr OSUNSADE and Mr TOA diving

Mr TOA on the left
Dr OSUNSADE on the right breathing from the spare air cylinder at a decompression stop area

Photograph sourced from Mr Robert KENT, email dated 17 May 2014 at 0211 hours

4.20. I believe that Dr OSUNSADE ran low on air during this dive given she was over weighted, which in turn increased her rapid breathing rate. This dive was to 33.1 metres with a bottom time of 17 minutes.

Comment:

4.21. Even with Dr OSUNSADE's high breathing rate and air consumption, her dives should have been tailored to shallower dives on the wreck of the SS President Coolidge or at Million Dollar Point.

4.22. According to Mr KENT, that same day himself, Dr OSUNSADE and Mr TOA were left at the dive scene, whilst the remainder of the tourists and guides were taken back into the township.

4.23. The three waited there for about an hour, according to Mr KENT, before the vehicle returned and they were taken to Million Dollar Point for their next dive.

4.24. Dr OSUNSADE, Mr KENT and Mr TOA (the dive guide) completed another dive that day at Million Dollar Point to a depth of 32.1 metres, with a bottom time of 14 minutes.

4.25. Million Dollar point is located approximately one kilometre from the wreck of SS President Coolidge.

4.26. Million Dollar Point has a large number of military vehicles that were dumped by the US marines at the end of World War II, by pushing the vehicles into the sea.

4.27. The collection of vehicles now forms a safe diving environment that the local dive companies use as a dive site. Divers can walk off a sandy beach and within a short distance, are swimming amongst an artificial reef of vehicles.

4.28. At Million Dollar Point, Mr KENT used his underwater video camera, and took a short video clip. This video clip is only 12 seconds long. This video footage shows Dr OSUNSADE breathing rapidly, which I believe can be attributed to her being over weighted.

4.29. On the return to Aquamarines dive shop, Dr OSUNSADE made a booking to complete two dives the following day.

4.30. On Wednesday 1 May 2013 at about 8:30am, Dr OSUNSADE was picked up from her hotel, and taken to the dive site of the SS President Coolidge for her fourth dive.

4.31. Dr OSUNSADE completed a dive to 'The Lady' to a depth of 39.7 metres with a bottom time of 21 minutes with Mr TOA guiding the dive. This is a well-known feature on the SS President Coolidge

Photo 3: Photo of 'The Lady'

4.32. 'The Lady' is a mosaic tile of a woman and her unicorn that has been relocated from within the SS President Coolidge, to now sit on C Deck. 'The Lady' can be easily accessed via a sea door, referred to as Euart's Door.

4.33. 'The Lady' is situated at a depth of 42 metres.

4.34. Dr OSUNSADE is reported to have completed a dive on the SS President Coolidge to the vicinity of ‘The Lady’.

4.35. There is no evidence to suggest Dr OSUNSADE had to use a spare air cylinder to complete the dive, but I note she only reached a depth of 39.7 metres, so she has not reached ‘The Lady’ prior to the group she was with starting their ascent to the decompression stop areas.

4.36. Looking at tide charts for this year, the variation in tides in May varies in height between low and high tide of 0.85 metres and 1.04 metres. In a best case scenario, Dr OSUNSADE would still be one metre above ‘The Lady’, which would mean Dr OSUNSADE was back up the corridor, away from ‘The Lady’.

4.37. The dive duration was 21 minutes, but this included a short dive down to 15 metres, before Dr OSUNSADE resurfaced. She left the surface again at nine minutes after her initial descent, meaning the actual dive to ‘The Lady’ was only 12 minutes long.

4.38. I believe that Dr OSUNSADE’s breathing rate, due to being over weighted, contributed to this short dive on Wednesday 1 May 2013, and I believe why she was taken on a one-on-one dive the following day with her dive guide Mr TOA.

4.39. This dive was planned as a 25 minute dive.

4.40. According to Mr SYED, he was spoken to by three divers from the group who had been diving with Dr OSUNSADE that day; they made a complaint relating to the short dive that morning. Mr SYED did not name those who made the complaint. Enquiries are unable to establish who these people were.

4.41. As a result of those complaints, Mr SYED opted for Dr OSUNSADE to dive one-on-one with a dive guide for the following days diving.

4.42. That same day at about 2:30pm, Dr OSUNSADE completed another dive on the SS President Coolidge guided by Mr TOA, this time to the front two cargo holds, which typically is limited to a maximum depth of 34 metres.

4.43. Again Dr OSUNSADE has left the surface, to resurface again partway through her dive after 8 minutes, before leaving the surface and continuing on the dive. Enquiries have been unable to explain why this occurred.

4.44. Upon returning to Aquamarine, Dr OSUNSADE has booked in to complete another dive with Aquamarine for Thursday 2 May 2013.

4.45. That same day, a group of divers from Australia started diving on the SS President Coolidge, using Aquamarine guides.

4.46. In this group were:

- Mr John GRANSBURY (Tour leader)
- Dr Jessica STAKER
- Mr Craig ROBERTS
- Mr Roger GRANSBURY
- Mr Maurizio LA ROCCA
- Mrs Zara LA ROCCA
- Mr Michael O'SULLIVAN
- Mrs Andrea MATTIAZZI

4.47. During the pre-dive safety checks conducted by a number of the group above, a number of divers detected what they believe to be foul air coming from the dive cylinders, which belonged to Aquamarine.

4.48. The group dived with the dive cylinders provided by Aquamarine to the Promenade Deck in the morning, and after the dive, some of the divers from this group had sore throats as well as headaches. Divers who noted bad air were: Mr John GRANSBURY, Mr Roger GRNSBURY, Mrs Andrea MATTIAZZI, Mr Craig ROBERTS, Mr Maurizio LA ROCCA

4.49. Mr John GRANSBURY spoke to Mr SYED and brought the concern of foul air to his attention.

4.50. The dive group were told by Mr SYED that Aquamarine had drained all dive cylinders, as well as checking the compressor. It is suspected the dive cylinders were refilled for the afternoon dive.

4.51. I am unable to establish who from Aquamarine advised Mr John GRANSBURY's group that the dive cylinders were refilled.

4.52. However, on the afternoon dive, some of the group again detected foul air. Those who noted bad air again were: Mrs Zara LA ROCCA, Mr Craig ROBERTS and Mr Roger GRANSBURY. Mrs MATTIAZZA commented that most of the group thought the air was bad on the afternoon dive, but did not say that her air was bad.

4.53. When contacted by myself, Mr Maurizio LA ROCCA advised the air smelt like burnt rubber tyres.

4.54. Mr LA ROCCA also noted his first stage regulator had a build up of residue powder, and on a later dive, his air was blocked. He had to rely on his wife's alternate second stage regulator to enable him to reach a spare dive cylinder so that he could complete his decompression / safety stop.

Note:

4.55. Further reference relating to this sudden loss of air will be commented on, later in the report in Section 4.5 – Cylinder contents.

4.56. The dive group containing Mr John GRANSBURY and Mr Roger GRANSBURY, Dr STAKER, Mr ROBERTS and their dive guide Mr David TONY, dived Cargo Holds 1 and 2 on the SS President Coolidge.

4.57. The group containing Mr and Mrs LA ROCCA, Mr O'SULLIVAN, Mrs MATTIAZZI and their dive guide Mr Tula JEREMIAH were supposed to dive Cargo Holds 1 and 2, but instead dived to the Barber Chair as well as Cargo Holds 3 and 4.

Comment:

4.58. Although tourists are completing these dives on the SS President Coolidge as recreational dives, the nature of the diving (depth, wreck penetration and decompression stops) makes most, if not all, dives a technical dive. It is therefore prudent for dive operators to treat every dive as a technical dive, with robust dive plans for each days diving activities, with mandated surface intervals, which will reduce the risk of decompression sickness.

4.59. After the dive, Mr John GRANSBURY approached Mr SYED and asked him to hire dive cylinders from his competitors for the remainder of their dives.

4.60. Mr John GRANSBURY approached Mr SYED because his solution of emptying and refilling the dive cylinders did not rectify the issue of foul air.

4.61. On Thursday 2 May 2013 at about 8:30am, Dr OSUNSADE and Mr John GRANSBURY's group were picked up from their hotels, and taken to the dive site of the SS President Coolidge.

4.62. On Thursday 2 May 2013, only Mr John GRANSBURY's group were supplied dive cylinders from Santo Island Dive and Fish, and both Dr OSUNSADE and Mr TOA were diving with dive cylinders from Aquamarine.

4.63. According to an unsigned statement/account dated Thursday 2 May 2013, Mr TOA, the dive guide for Aquamarine, stated:

4.64. *"Laila (DR OSUNSADE) asked him to take her to the Medical Supplies dive".*

4.65. *"After I briefed her, we went diving to the dining saloon where 'The Lady' is located".*

4.66. *"She could not go further, so I gave her the signal for us to exit the ship".*

4.67. *"We were completely out of the ship and were heading to and getting close to the bow and she seemed fine".*

4.68. *"After about five minutes, I looked back to check on her and she was not there".*

4.69. When Mr TOA was interviewed by Vanuatu Police on Friday 3 May 2013, Mr TOA told Vanuatu Police, he was diving to the Doctors Office with Dr OSUNSADE.

4.70. In a translated statement, Mr TOA stated the following:

4.71. *"Laila (Dr OSUNSADE) asked him if he could take her to the Doctors Office".*

4.72. *"After I briefed her about the dive, the two of us went diving".*

4.73. *"We entered the wreck by the dining saloon by the statute of 'The Lady'".*

4.74. *"We stopped for a small time at the statute. We dived around the ship for about ten minutes. Dr OSUNSADE gave him a back signal to go back".*

4.75. *"I gave her the signal that we needed to come out of the ship now".*

4.76. *"We both came out of the ship and stopped near the front of the ship and it was okay. We stayed there for five minutes".*

4.77. *"After five minutes was up, I looked around and Dr OSUNSADE was no longer there".*

4.78. When Mr TOA was interviewed by me in March 2014, he stated, Dr OSUNSADE requested to dive to 'The Lady' again.

Comment:

4.79. I believe there are discrepancies in the dive completed. However, to dive to the Doctors Office, you can pass by 'The Lady'. Also given where the deceased was found, it is more probable Mr TOA had advised Vanuatu Police of the correct dive the day after the incident. These discrepancies are:

- In an unsigned statement dated Thursday 2 May 2013 – Mr TOA advised he was taking Dr OSUNSADE to the Medical Supplies dive

- On Friday 3 May 2013 – Mr TOA told Vanuatu Police he was taking Dr OSUNSADE to the Doctors Office

- When I interviewed Mr TOA in March 2014 – Mr TOA told me he was taking Dr OSUNSADE to 'The Lady'

4.80. I am unable to explain the changes in Mr TOA's statement.

4.81. As for all other dives which Dr OSUNSADE completed with Aquamarine, a dive briefing was covered by Mr TOA for their dive.

4.82. When Mr TOA was interviewed by me in March 2014, he stated he gave Dr OSUNSADE the following briefing and conducted the following checks:

4.83. *"I helped her set up her gear, I check her gear, then she check gear. There was nothing wrong. She told me she wanted to do 'The Lady' dive again. We had maybe 240 to 250 Bar. When I do my checks on dive gear, I look for over 220 Bar, air on full and back half turn, check inflate and deflate, check dumps work, purge, torches work, check they know how to release weight belt. I do same briefing as the day before. I do Safety briefing first, then dive briefing. I cover; Safety stops what depth and what time (5 min at 9 metres, 7 min at 6 metres, 12 min at 3 metres), signals for okay, not well, up, down, for the air we cover signals for over 100 Bar – one finger, at 100 Bar – signal okay, under 100 Bar – show me your gauge.*

4.84. *"In the dive briefing, I told her; We are doing 'The Lady', entry and exit from the water, maximum bottom time 25 minutes, the maximum depth 40 metres, the stops (depth and time, 5 min at 9 metres, 7 min at 6 metres, 12 min at 3 metres), when to turn on the torches, check air often, cover from the land to the bow, to sea door, turn on torches before going in".*

Note:

4.85. Although this safety briefing looks to be detailed, there are errors/omissions such as what to do if a diver becomes separated from the dive guides, which will be highlighted later in this report. Refer to section on diving briefings at Section 11, paragraph 11.2.

4.86. Both Dr OSUNSADE and Mr TOA walked out until they were in sufficient depth of water to put on their fins, before finning on the surface to the three metre decompression area.

4.87. From witness statements there were a total of five groups from Aquamarine diving that morning.

- Mr Tula JEREMIAH – Guiding to the Engine Room
- Mr David TONY – Guiding to the Engine Room
- Mr Simon TOA – Guiding to the Doctors Office
- Unknown dive guide – Guiding to 'The Lady'

- Donald (unknown dive guides surname) – Guiding to the Promenade Deck

4.88. There are conflicting accounts as to which group got into the water first, however two groups (Mr JEREMIAH's and Mr TONY's groups) had a longer surface swim to the far surface buoy before they could start their dive.

4.89. The three remaining groups all left the surface at the three metres decompression stop area.

4.90. According to Mr AULD, he was delayed by a sinus block and was passed in water by the Australian group. This group I believe were diving to 'The Lady'.

4.91. Mr AULD also commented on seeing a dive guide with a slung dive cylinder, and in an initial conversation with Mr AULD, he stated the diver with this dive guide to be Dr OSUNSADE. However in further email correspondence, Mr AULD stated he did not name anyone and is sticking to his original statement which does not identify the dive guide and diver.

4.92. The first group dived to the Engine Room guided by Mr JEREMIAH.

4.93. Mr JEREMIAH states his group spent five minutes in the engine room prior to swimming onto B Deck, up to C Deck where they passed by 'The Lady'.

4.94. Mr JEREMIAH did not see Mr TOA or Dr OSUNSADE during this dive. When Mr JEREMIAH surfaced, Mr TOA was on the shore.

4.95. I also believe Mr JEREMIAH has confused the decks, as the Engine Room is located on E Deck, and he would swim up to D Deck before swimming into C Deck then through to where 'The Lady' is located.

4.96. The second group diving to the engine room was guided by Mr TONY, who left the shoreline approximately 15 minutes after Mr JEREMIAH's group.

4.97. Mr TONY states he spent three minutes in the engine room, which is located on the B Deck, and swam onto the C Deck. He swam past 'The Lady, and followed C Deck through to Cargo Hold 2. He did not see anyone else on that dive when they were inside the ship.

4.98. I again believe Mr TONY has made an error on which deck the Engine Room is located on; it is located on E Deck.

4.99. Mr TONY surfaced after his dive, and stated that after surfacing he saw Mr JEREMIAH swimming towards him asking to help in the search for Dr OSUNSADE.

4.100. The third group dived to ‘The Lady’ and enquiries reveal Mr John GRANSBURY and Dr STAKER were on this dive. Both stated they did not see Dr OSUNSADE.

4.101. After this group surfaced, they were made aware of a missing diver and Mr John GRANSBURY assisted by searching on the surface looking for air bubbles coming up from the wreck.

4.102. According to Mr Justin AULD, he stated he was diving to the Promenade Deck that morning on the SS President Coolidge, and he believes he saw Dr OSUNSADE swimming by herself heading towards the stern at the end of his dive.

4.103. At the end of his dive after he surfaced, Mr AULD stated he was incapacitated and went off to a quiet area to address his nose bleed for about ten minutes. He recalls being the first diver out of the water. He also believes his dive guide was the first guide out of the water.

4.104. Mr AULD stated 10 to 15 minutes later a group of four surfaced and that’s when he became aware that a diver was missing.

4.105. Mr TOA and Dr OSUNSADE were the fifth group diving that day from Aquamarine and it is believed they were diving to the ‘Doctors Office’, this dive passes by the Promenade Deck dive, before entering Euart's Door and this dive passes by ‘The Lady’.

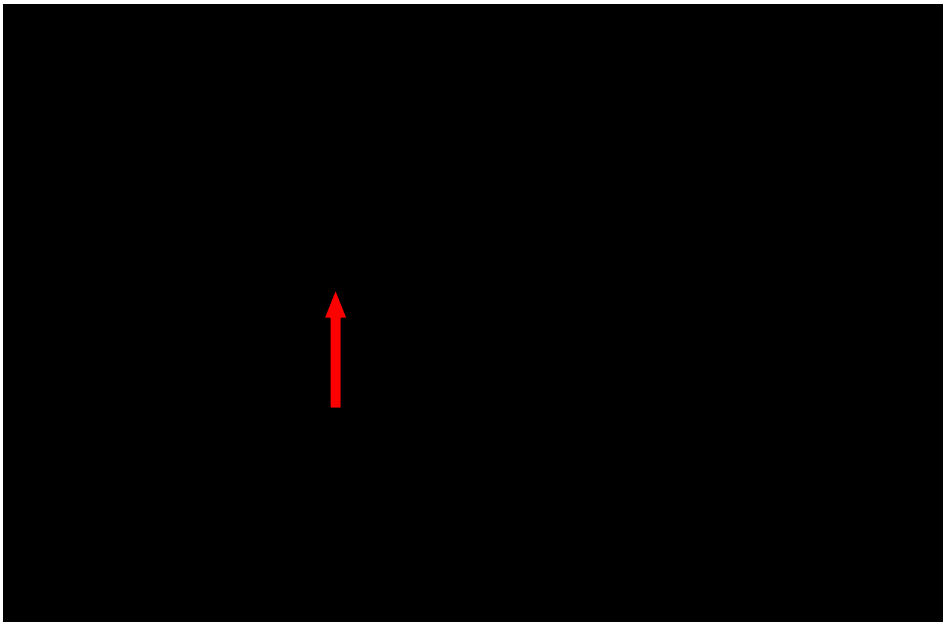


Photo 4: Photo of Dive area

Red arrow indicates approximate location of the 3 metre decompression stop area.
Bottom left of the photo is where Aquamarine divers enter the water (Photo taken at high tide)

Photo 5: Photo of dive area

Aquamarine guide pictured in front and customer entering the water (Photo taken at high tide)
Red arrow refers to rocky outcrop indicated in photo above which is out of the field of this shot.

4.106. Both Dr OSUNSADE and Mr TOA left the surface at 10:28am Vanuatu time and followed the rope, which runs from the decompression stop area to the bow of the SS President Coolidge.

4.107. According to Mr TOA, both he and Dr OSUNSADE swam down the starboard side of the SS President Coolidge, past the sharks' cage to the sea door (Euart's Door).

4.108. Euart's Door provides access to C Deck, which is where "The Lady' is located.

4.109. Mr TOA stated they both turned on their dive torches prior to entering the SS President Coolidge and Dr OSUNSADE had about 200 Bar of cylinder contents remaining at this point. According to Mr TOA, Dr OSUNSADE started the dive with between 240 - 250 Bar cylinder contents.

4.110. Mr TOA led the way, entering through the sea door slowly (Euart's Door), into the passage way that leads to 'The Lady'. The wreck penetration was unaided by any reel or guideline.

4.111. Once inside the SS President Coolidge, this area is pitch black, with no natural light once you are away from the sea door.

Photo 6: Diver outside Euarts Door

Picture sourced from http://www.michaelmcfadyenscuba.info/viewpage.php?page_id=617

Photo 7: Diver inside SS President Coolidge looking up towards Euarts Door

NOTE: Camera is using a flash, there is no natural light away from Euart's Door
Picture sourced from http://www.michaelmcfadyenscuba.info/viewpage.php?page_id=617

4.112. According to Mr TOA, prior to reaching 'The Lady' Dr OSUNSADE had indicated to Mr TOA that something was wrong and indicated she wanted to go back.

4.113. Mr TOA is unsure what depth they got to when Dr OSUNSADE indicated to him something was wrong.

4.114. I cannot tell from Dr OSUNSADE's dive computer profile, where this has occurred.

4.115. According to Mr TOA, they both swam back to the sea door where they had entered the wreck; Mr TOA exited the wreck first and waited for Dr OSUNSADE to exit.

4.116. After Dr OSUNSADE exited the sea door, she signalled to Mr TOA she wanted to swim back towards the bow.

4.117. Mr TOA states that prior to starting the swim back he showed Dr OSUNSADE his submersible pressure gauge (SPG), and Dr OSUNSADE signalled to him 'okay', which meant, as per the dive briefing, she had over 100 bar of cylinder contents.

4.118. Mr TOA states Dr OSUNSADE again signalled she was unwell and he noticed she was breathing faster than earlier in the dive.

4.119. Mr TOA states he led the way back towards the bow, noting Dr OSUNSADE to be approximately six to seven metres behind him as they swam along.

4.120. According to Mr TOA, when he reached the area where the medical supplies and the front of the bridge are, he went to check on Dr OSUNSADE and discovered she was missing.

4.121. Mr TOA states that he started searching for Dr OSUNSADE, checking the starboard side.

4.122. He swam back to the sea door where they had entered the SS President Coolidge to see 'The Lady', and shone his torch into the passage way but was unable to locate Dr OSUNSADE.

4.123. Mr TOA states he swam back towards the bow, checking around the area where the five inch gun is (near the bow) before swimming back to the decompression stop areas and surfacing without completing any decompression stops.

4.124. Once back on the surface, Mr TOA waved to Mr SYED who was onshore to raise his attention.

4.125. Once Mr TOA was within ear shot of Mr SYED, he asked if he had seen Dr OSUNSADE.

4.126. Mr SYED advised Mr TOA he had not seen Dr OSUNSADE, so both waited on the shore until the remainder of Aquamarine's divers and guides returned to the surface.

4.127. Mr SYED asked his two dive guides, Mr TONY and Mr JEREMIAH to conduct an underwater search for Dr OSUNSADE, whilst other guests snorkelled on the surface looking for bubbles from Dr OSUNSADE.

4.128. I estimate both dive guides left the surface at approximately 11:00am to look for Dr OSUNSADE.

4.129. A tourist diving with Aquamarine, Doctor Jessica STAKER, requested Mr SYED to gather all medical equipment he had available including the oxygen tank.

4.130. Dr STAKER advised that Mr SYED stated “We should wait for the ambulance to arrive”.

4.131. Dr STAKER repeated her request to Mr SYED, whereby he retrieved a small plastic box containing an old facemask and attachments for an oxygen cylinder. Dr STAKER noted there was no self-inflating bag and no oxygen cylinder.

4.132. When interviewed by me, Mr SYED stated that at about this time he called the hospital and asked them to send an ambulance. He also called friends in town so they could contact any doctors and get them to the dive site.

4.133. During this time, both Mr TONY and Mr JEREMIAH retraced Mr TOA’s dive back to the sea door that leads to ‘The Lady’.

4.134. Both guides entered the wreck through the sea door, with Mr TONY remaining close to the sea door, whilst Mr JEREMIAH swam down to where ‘The Lady’ is located on C Deck.

4.135. Mr JEREMIAH reached ‘The Lady’, and did not locate Dr OSUNSADE, but noted the water was silty.

4.136. According to Mr JEREMIAH, he swam from C Deck onto B Deck where within metres of reaching B Deck, he located Dr OSUNSADE, who was unresponsive and not breathing.

4.137. Mr JEREMIAH noted Dr OSUNSADE was lying on her back, her head was facing the top deck and feet were towards the keel. Dr OSUNSADE’s mask was in place but her regulator was dislodged from her mouth. He also noted Dr OSUNSADE was missing both fins, she had some air in her BCD, there was no air leaking from her regulators, her torch was not on and she had 100 Bar of cylinder contents.

4.138. Mr JEREMIAH believes the depth was 41 metres.

4.139. Mr JEREMIAH advised me he inflated Dr OSUNSADE's BCD and was able to move her back to the sea door where both dive guides were able to recover Dr OSUNSADE back to the decompression stop area.

4.140. As both dive guides had now completed another deep dive, they both had to spend time decompressing before being able to safely leave the water.

4.141. Snorkellers on the surface dived down to the dive guides, and brought Dr OSUNSADE to the surface, where she was dragged onto the beach by six or seven men. According to Dr OSUNSADE's dive computer, she surfaced at 11:30 am.

4.142. According to Dr STAKER, the following occurred:

4.143. *"Her clothes were cut to increase exposure and access".*

4.144. *"There were no signs of life… no respiratory effort, no pulse. There was foam at the nose and lips. We rolled her into the recovery position to clear her mouth then on her back again and CPR was commenced by a diver from our group".*

4.145. *"I used the available mask to attempt to deliver breaths but was unable to continue due to refluxed gastric contents and sea water".*

4.146. *"CPR was continued in cycles until the paramedic (volunteer from Queensland) arrived. He had brought resuscitation equipment with him. CRP continued, defibrillator pads were attached and a size 4 Laryngeal Mask Airway was inserted. Able to ventilate with self-inflating bag. Unable to gain IV access. No shockable rhythm located. Pupils fixed and dilated".*

4.147. During this time, Mr SYED contacted Mr Malcolm DAVIES from Santo Island Dive and Fish at approximately 11:20am.

4.148. Mr SYED advised Mr DAVIES a death had occurred and requested Mr DAVIES to come to the scene.

4.149. That same day at approximately 11:30 am, Mr David ELLABY (referred to above as the paramedic) was in Santo township when he received a call from a person known as Mary, advising him of the incident occurring at the SS President Coolidge dive site.

4.150. Mr ELLABY took a short taxi ride to Medical Santo where he picked up medical equipment including a defibrillator, resuscitation bag and medical kit.

4.151. During this time Mr Rayman LEUNG, the Managing Director of 'The Espiritu', the hotel where Dr OSUNSADE was staying, learnt of the incident unfolding at the dive site of the SS President Coolidge.

4.152. According to Mr LEUNG, he called Mr David ELLABY at Medical Santo to assist.

4.153. Mr LEUNG left the motel, went to Mr SYED's house to collect an oxygen cylinder and went to Medical Santo to uplift Mr ELLABY.

4.154. On the way to the dive site, Mr ELLABY called Santo Hospital Ambulance and asked for the ambulance to go to the dive site for a medical emergency.

4.155. Both Mr LEUNG and Mr ELLABY arrived at the scene whilst CPR was being conducted, and Mr ELLABY assisted Dr STAKER in resuscitation.

4.156. According to Dr STAKER:

"After discussion with the paramedic we called the time of death at 1150hrs. Dr OSUNSADE was covered with towels".

4.157. At approximately 12:00pm, Mr DAVIES arrived at the Aquamarine dive site. By that stage, neither Police nor the Ambulance had arrived at the scene.

4.158. According to Mr ELLABY, the ambulance took some time to arrive.

4.159. After CPR had stopped, a number of dive operators and a member of a dive party checked Dr OSUNSADE's BCD, regulators and cylinder contents, and were unable to find any fault with the operation of the regulators or BCD.

4.160. It was noted the cylinder contents gauge read at least, if not more than, 100 bar and when the air was smelt those present, apart from Mr SYED, believed the air was foul, as if it was tainted with oil.

4.161. Those who checked the Deceased's equipment at the dive site were:

- Mr DAVIES,
- Mr John GRANSBURY, and
- Mr SYED.

4.162. According to notes made by Corporal Peter SOLWIE from Santo Police, Police arrived at the scene at 12:10pm, 20 minutes after CPR ceased.

4.163. Santo Police obtained scene photographs of the dive gear Dr OSUNSADE was using and photographed the Deceased covered in towels.

4.164. At 12:25pm that day, Santo Police seized all dive equipment Dr OSUNSADE was using from the scene, including any belongings she had with her.

4.165. Dr OSUNSADE was removed from the scene by Ambulance and taken to the Mortuary, where she was examined.

4.166. The Deceased was using some of her own equipment (mask, snorkel and dive watch), but the majority of the dive equipment was hired through Aquamarine, with the exception of the BCD which had been hired from Santo Island Dive and Fish by Mr SYED for Dr OSUNSADE.

4.167. The following dive equipment was seized by Vanuatu Police and received by the New Zealand Police National Dive Squad (PNDS) for examination:

(a) Catalina dive cylinder

(b) Oceanic regulator set with primary and secondary regulators

(c) Black mesh pocket weight belt

(d) Aqualung dive boots

(e) Black Mako fin (recovered in September 2013)

(f) Black Holis LED torch

(g) Mares Vector BCD

(h) Aqualung dive mask

(i) Aqualung snorkel

(j) Suunto D9 dive watch, and

(k) Water bottle containing water.

4.168. It is believed that items (a – f) belong to Aquamarine, item (g) belongs to Santo Island Fish and Dive, and the remaining items belong to the Deceased.

4.169. In July 2013 Mr Alfred LASA, who works for Santo Island Dive and Fish, located a fin on B Deck lying in the silt at a depth of 45 metres. This fin was returned to Mr SYED at Aquamarine.

4.170. In approximately September 2013 Mr LASA found another fin on B Deck, close to where he found the first fin. The second fin was located at a depth of about 50 metres, again lying in the silt. This fin was retained by Mr LASA and handed to me in March 2014.

4.171. Although we are unable to categorically prove/disprove the fins were those the Deceased was using on the fatal dive, it provides credibility to Mr JEREMIAH's statement regarding where he located the Deceased, as she was not wearing fins when she was recovered.

5. EQUIPMENT EXAMINATION

5.1. Dive cylinder

Make:	Catalina
Colour:	Grey
Manufactured:	April 2007
Hydro Inspection:	Unknown
Visual Inspection:	Unknown
Serial:	DI0004154
Capacity:	11.4 kg
Working pressure:	241 Bar

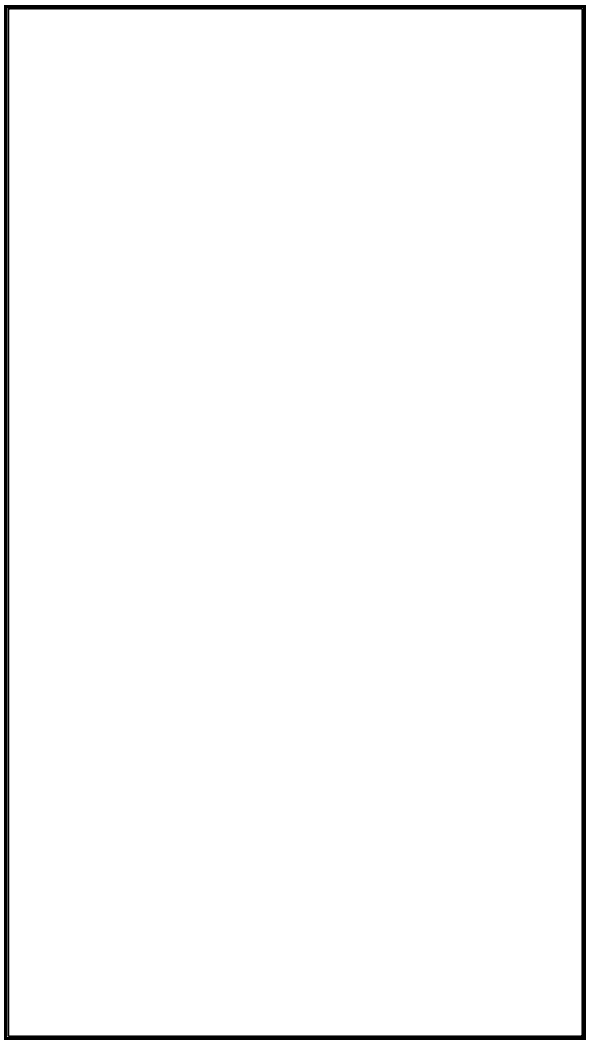


Photo 8: Dive Cylinder

5.1.1. The role of a cylinder is to provide a reservoir of breathable air to a diver, which allows them to spend an extended period underwater.

5.1.2. This cylinder was located on the Deceased and recovered by Mr TONY and Mr JEREMIAH and handed to Vanuatu Police at the scene.

5.1.3. The dive cylinder, when tested with calibrated gauges by me, gave a reading of 40 Bar of cylinder contents.

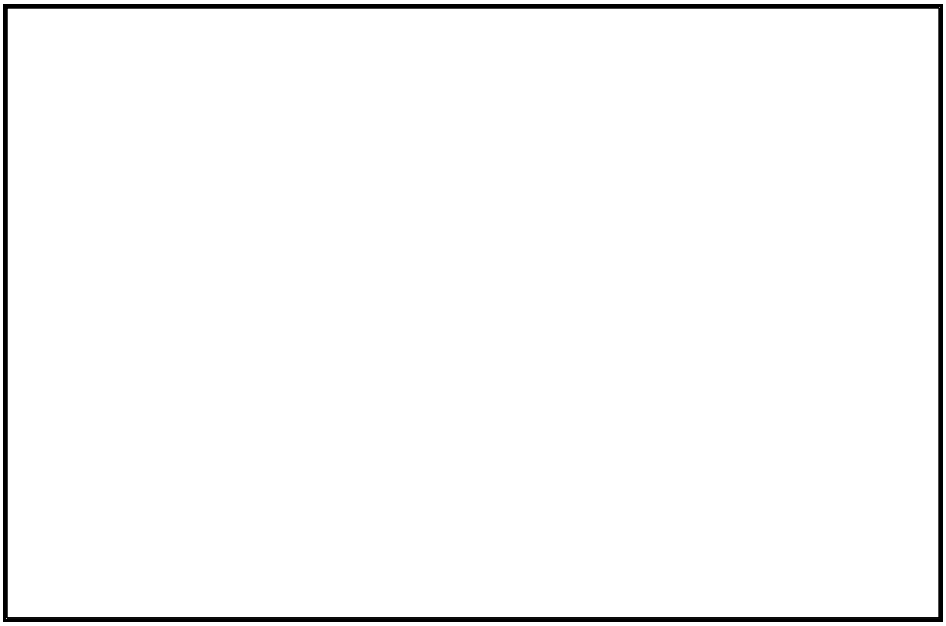


Photo 9: Calibrated pressure gauge showing 40 Bar cylinder contents

5.1.4. This dive cylinder is constructed of aluminium.

5.1.5. The cylinder was in good condition externally, but shows signs of oxidation around the neck of the dive cylinder where the valve is. This raises concerns over how often the dive cylinder is washed, serviced and more importantly either visually or hydrostatically tested.

Comment:

5.1.6. Enquiries show Aquamarine is hydrostatically testing their dive cylinders approximately every three years. It is also not known what post dive maintenance / wash down procedures are in place from Aquamarine.

5.2. Cylinder certification

5.2.1. A scuba cylinder is required to be tested, commonly referred to as 'in date' for it to be filled with compressed air.

5.2.2. Cylinders are pressure tested (hydrostatic) every two years and a visual test is completed every year in New Zealand.

5.2.3. This means that in New Zealand when a dive cylinder is due for a hydrostatic test, it also receives a visual test as well.

5.2.4. Enquiries by PNDS reveal there currently no hydrostatic test schedules for hydrostatic testing of dive cylinders in Vanuatu.

5.2.5. The Vanuatu Department of Tourism were due to meet with the Vanuatu Parliament in August 2014 in an attempt to mandate a code of conduct for dive operators.

5.2.6. The code of conduct if approved will mandate hydrostatic and visual dive cylinder testing every three years.

5.2.7. Enquires with one of the cylinder testing companies in Vanuatu (Big Blue Vanuatu), show they are currently recommending dive cylinders are hydrostatically tested every three years.

5.2.8. Therefore, it is currently up to each dive operator to maintain a hydrostatic test program themselves.

5.2.9. From my examination and visit to Aquamarine, I found that some dive cylinders are being tested on or about the three year mark, whereas other dive cylinders have not been tested since they were manufactured in 2007.

5.2.10. I contacted the cylinder manufacturer and was advised their recommendation for hydrostatic testing is set at every five years.

5.2.11. The cylinder manufacturer advises that visual inspections should be conducted annually.

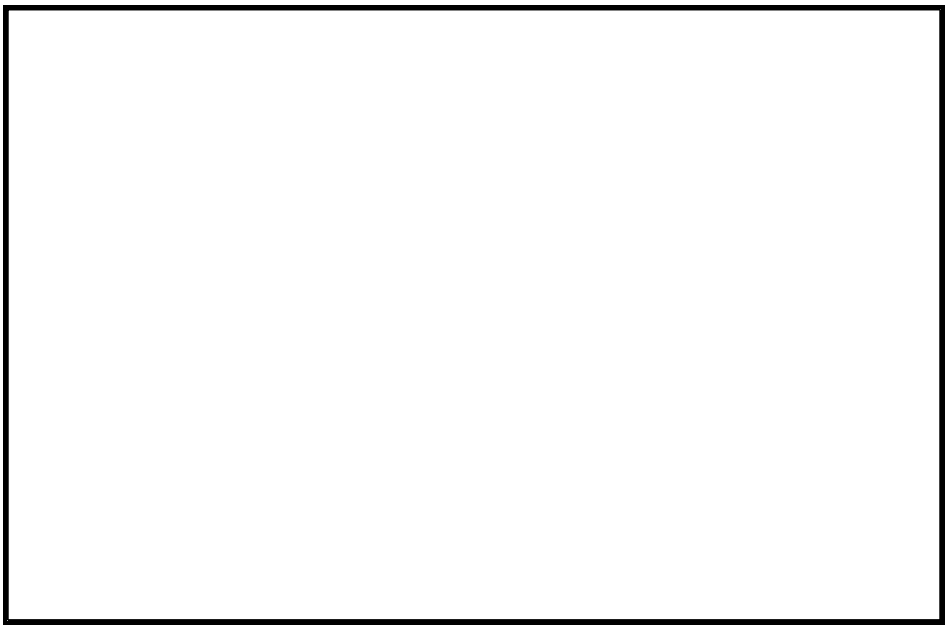


Photo 10: Close up of dive cylinder showing date of hydrostatic test

5.2.12. Dr OSUNSADE's dive cylinder's last hydrostatic test is unknown, as the test facility has not clearly stamped the dive cylinder.

5.2.13. When compared with other Aquamarine dive cylinders, there is an assumption the dive cylinder has been inadvertently stamped with the year ‘0010’, when it should have been stamped ‘2010’.

Comment:

5.2.14. Recording dive cylinder serial numbers and accurately marking a dive cylinder is a required standard if this testing were to be conducted in New Zealand.

During my visit to Aquamarine, Mr SYED was asked to produce service log books for all of his rental gear. Mr SYED failed to produce the service log books. Further requests went unanswered.

5.2.15. When other Aquamarine dive cylinder hydrostatic date stamps were checked by me, there are hydrostatic test date stamps showing testing being conducted in 2010 and again in 2013.

5.2.16. When Mr SYED was interviewed by myself in March 2014 he stated:

5.2.17. *“When I purchased the business, Big Blue, a company in Port Vila was doing the hydrostatic testing, and I have continued to send my dive cylinders to them. Last hydro may have been with Nautilus. When the cylinders are returned, they come back with month and year stamps on them. This testing is done yearly. We also do visual testing every six months ourselves. Our staff have been trained by the previous owner, so this has been passed down through the staff. I have been taught by the previous owners”.*

5.2.18. I believe Mr SYED has no formal training on visually inspecting dive cylinders, other than that of information passed down from the previous owners.

5.2.19. In order to verify Mr SYED’s statement around hydrostatic dive cylinder testing, I contacted Nautilus in Port Vila, Vanuatu. Mr Peter PHILLIPS from Nautilus provided the following responses to our enquiries:

5.2.20. *“We do inspect and hydro test tanks for Aquamarine on request”.*

5.2.21. *“Within the past 5 years we have visually inspected and hydro tested tanks for Aquamarine, according to our records the invoice was raised on the 16th May 2013 for 30 tanks, for your information you need to allow for time for the tanks to be shipped from Santo to Vila and then shipped back to Santo on completion (this process can take approx 1 month) prior to that we also hydro tested and visually inspected tanks in March 2010 (unable to bring up how many but you would be looking at approx 38 tanks according the total of the invoice)”.*

5.2.22. *"I am afraid that we do not keep a record of cylinder numbers, once the tanks are completed we date stamp the top of the neck, we do not have a distinguishing stamp that will verify that it was Nautilus who preformed this service. Any tanks that do not pass are condemned by condemned we chizzle the neck of the tank so that a valve can no longer be attached".*

5.2.23. In order to verify Mr SYED's statement around hydrostatic dive cylinder testing, I also contacted Big Blue Vanuatu in Port Vila, Vanuatu. Mike from Big Blue Vanuatu provided the following responses to our enquiries:

5.2.24. *"We have not done any testing for aquamarine".*

5.2.25. *"We have not received any tanks from Aquamarine over the last five years".*

5.2.26. *"Up until recently it has been up to the Dive operator to take care of their own tanks. There has always been several operators who do tank testing".*

5.2.27. *"Most operators who do testing have their own stamps".*

5.2.28. *"In the last 2 years Tourism Vanuatu has taken steps to put in place a set of standards for all Tour operators. I am on the standards committee".*

5.2.29. *"With Diving we basically follow the standards set by our training Agency i.e. PADI, SSI , Bsac etc. Also a code of conduct was set up in the late 90s for decompression diving. We are also making it mandatory for tanks to be tested every 3 years and air to be tested every 1 year".*

5.2.30. *"Also all operators will have to be members of the Vanuatu Scuba Divers Association or Vanuatu Tour Operators Association. Any breaches of standards will result in the Operator having his business license cancelled".*

5.2.31. *"The plan calls for the tourism council to appoint Inspectors to make spot checks".*

5.2.32. *"We are a third world country so it take a lot of time and donor money to get things done here".*

5.2.33. Based off this information provided by the cylinder testing companies and from Mr David CROSS from the Vanuatu Department of Tourism, I believe the cylinder was ‘in date’ to be used, as there are no mandated guidelines around dive cylinder testing in Vanuatu, i.e. dive cylinders hydrostatically tested every three years.

5.2.34. However, there are inconsistencies with Mr SYED’s statement regarding annual hydrostatic testing.

- Mr SYED states dive cylinders are hydrostatic tested annually,

- All dive cylinders I observed do not comply with this statement from Mr SYED. Dive cylinders were either not tested since being purchased, or tested in 2010. No cylinder testing has occurred between these dates.

5.2.35. At the conclusion of the interview with Mr SYED, I requested to see Aquamarine’s dive cylinders and dive compressor but this request, and later requests, went unanswered.

5.2.36. I do not believe the external dive cylinder condition contributed to the death, but the contents of the cylinder raised concerns (see section 4.4)

5.2.37. I visited the Aquamarine dive site at the SS President Coolidge on Saturday 8 March 2014 and observed seven dive cylinders being used by Aquamarine.

5.2.38. On close inspection, one of the unlabelled dive cylinders was being used as the oxygen cylinder in the event of a diving emergency. This is unsafe practice. Refer to section 9 on oxygen equipment for further information.

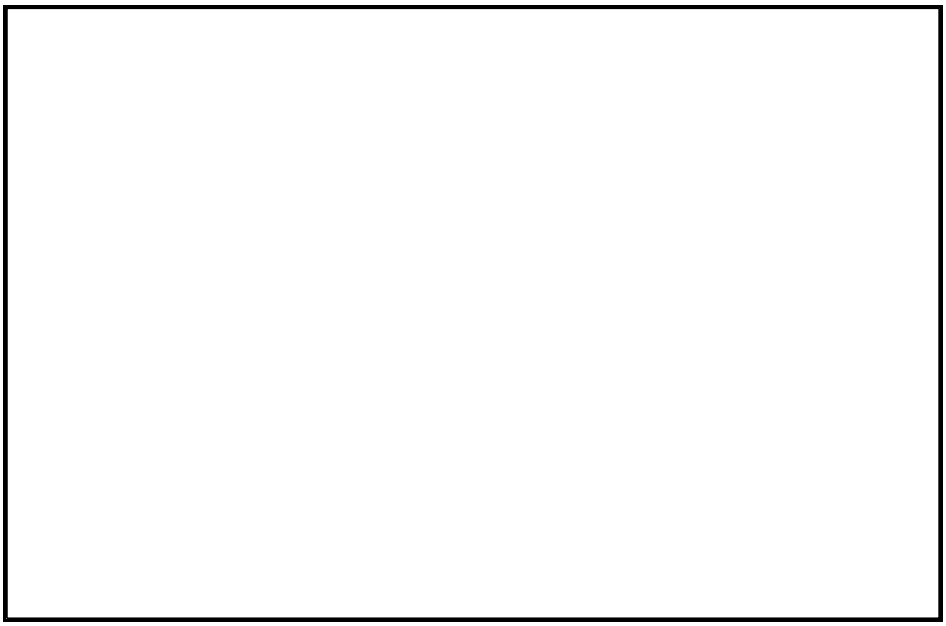


Photo 11: Aquamarine dive site/changing area

Trailer containing dive cylinders and oxygen filled 'dive' cylinder

5.2.39. Further inspection of the dive cylinders showed one of the seven dive cylinders checked by myself had no hydrostatic test stamp on the dive cylinder. This indicates the dive cylinder had not been hydrostatically tested since its manufacture in April 2007.

Comment:

5.2.40. As there are no mandated dive cylinder testing protocols currently in Vanuatu, there can be no inferences drawn from this. However, by New Zealand standards this would have been deemed to be unacceptable by the Ministry of Business, Innovation and Employment and PNDS, had this incident occurred in New Zealand. At the very least it exceeds manufacturer's specifications of five years.

5.2.41. Albeit there are currently no guidelines for hydrostatic dive cylinder testing, given the long periods between hydrostatic testing or no testing on some cylinders, this is a dangerous practice. The dive cylinder could fail or even explode, or contain contamination.

5.2.42. By Mr SYED's own statement, this dive cylinder should have been hydrostatically tested every year, and it has not been.

5.2.43. Mr SYED told me "… *Last hydro may have been with Nautilus. When the cylinders are returned, they come back with month and year stamps on them. This testing is done yearly. We also do visual testing every six months ourselves".*

5.2.44. This combination can lead to dive cylinders rupturing during use or during filling. These findings are not linked to the death of Dr OSUNSADE, but show poor/unsafe dive operator practices.

5.2.45. All dive cylinders remaining on shore to be used on the next dive were inspected by me and the following information was recorded:

Cylinder Number	***Manufactured***	***Test Date***	***Valve Pressure***
CC030162	07/2011	Nil	3300 PSI valve
CC026993	06/2011	Nil	3300 PSI valve
CC026384	06/2011	Nil	Nil stated
CC02268	06/2011	Nil	Nil stated
DI0004129	04/2007	Nil	Nil stated
CC032251	08/2011	Nil	230 Bar
CC030162	07/2011	Nil	230 Bar

5.2.46. These findings contradict Mr SYED's statement where he told me:

5.2.47. *"When the cylinders are returned, they come back with month and year stamps on them. This testing is done yearly".*

5.2.48. Mr SYED also alleges that every six months a visual inspection occurs

5.2.49. *"We also do visual testing every six months ourselves".*

Comment:

5.2.50. In New Zealand, when a dive cylinder is visually inspected, the dive cylinders are marked by either a plastic ring around the cylinder neck, or a stick on label with the month and year the visual test expires.

5.2.51. Given both of these statements by Mr SYED, it is difficult to understand how the dive cylinders from Aquamarine are not 'in-date' even by New Zealand standards. But there are no markings on the dive cylinders, or company records produced, to back up Mr SYED's statement regarding visual inspections.

5.3. Cylinder valve

Make:	Unknown
Model:	K Valve
Rating:	232 Bar

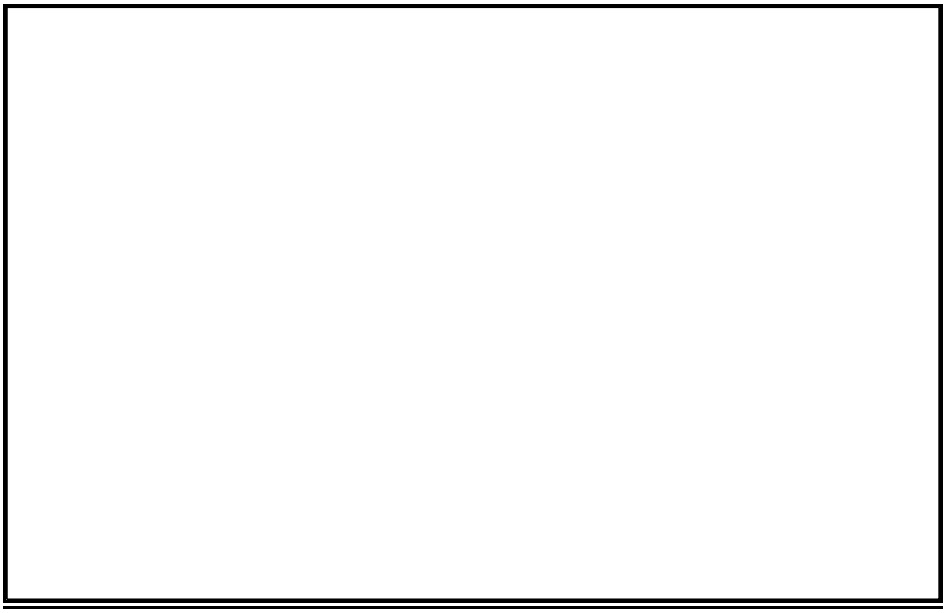


Photo 12: Cylinder Valve

5.3.1. The dive equipment was seized by Santo Police and it is not known who closed the cylinder valve to preserve the cylinder contents for analysis.

5.3.2. When spoken to by me, Mr TOA stated that prior to the dive the cylinder contents were as follows:

5.3.3. *" We had maybe 240 to 250 Bar".*

Comment:

5.3.4. Dr OSUNSADE's log book contradicts this pressure stated by Mr TOA. Dr OSUNSADE recorded 200 to 210 Bar for the dives between 29 April and 1 May 2013.

5.3.5. When Mr TONY was interviewed, he stated the dive cylinders are filled to 220 Bar.

5.3.6. Enquiries with Mr Robert KENT who dived with Dr OSUNSADE on Tuesday 30 April 2013 reveal Mr KENT started his first dive with 223 Bar, and on the second dive he started with 213 Bar.

5.3.7. Enquiries with Mr AULD who dived on Thursday 2 May 2013 reveal Mr AULD started his dive with 250 Bar.

5.3.8. During a site visit I completed in April 2014, I observed a dive cylinder filled to 240 Bar.

5.3.9. I am unable to explain the differences in fill pressures stated to me, but I believe Dr OSUNSADE's diver log book entries to be correct.

5.3.10. The cylinder valve is rated to 232 Bar, which is under the operating pressure of the dive cylinder of 240 Bar.

Comment:

5.3.11. To have pressurised the dive cylinder to over 241 Bar is not an acceptable practice, as it exceeds the safe working pressure of the valve and dive cylinder when inflated over 241 Bar.

Given the cylinder valve is rated to 232 Bar, this is the maximum pressure the dive cylinder can be filled to.

This dive cylinder should have been only filled to the pressure on the cylinder valve, which is 232 Bar.

5.3.12. When the cylinder valve was tested, it was found to function correctly.

5.3.13. The cylinder valve shows signs of being dropped/knocked. In conjunction with the overfilling of the dive cylinder, this increases the risk of the dive cylinder rupturing due to increased stresses placed on the dive cylinder valve through repeated overfilling.

5.3.14. The cylinder valve O-ring appeared on visual inspection to be seated correctly and to be in fair condition.

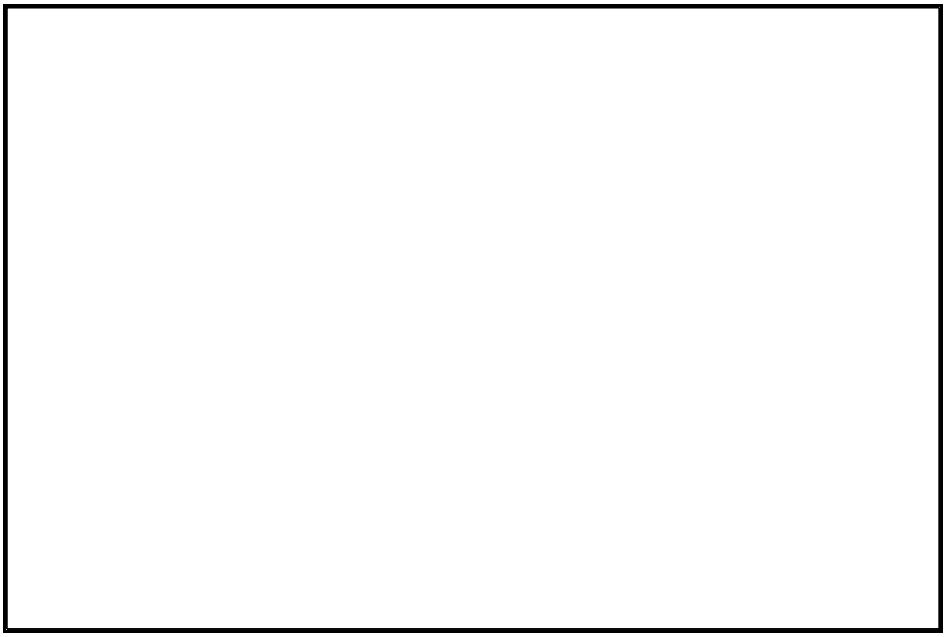


Photo 13: Close up of the cylinder O-ring

5.3.15. The cylinder valve was removed by ESR and inspected. It was noted that deposits were present around the interior of the valve and dip tube.

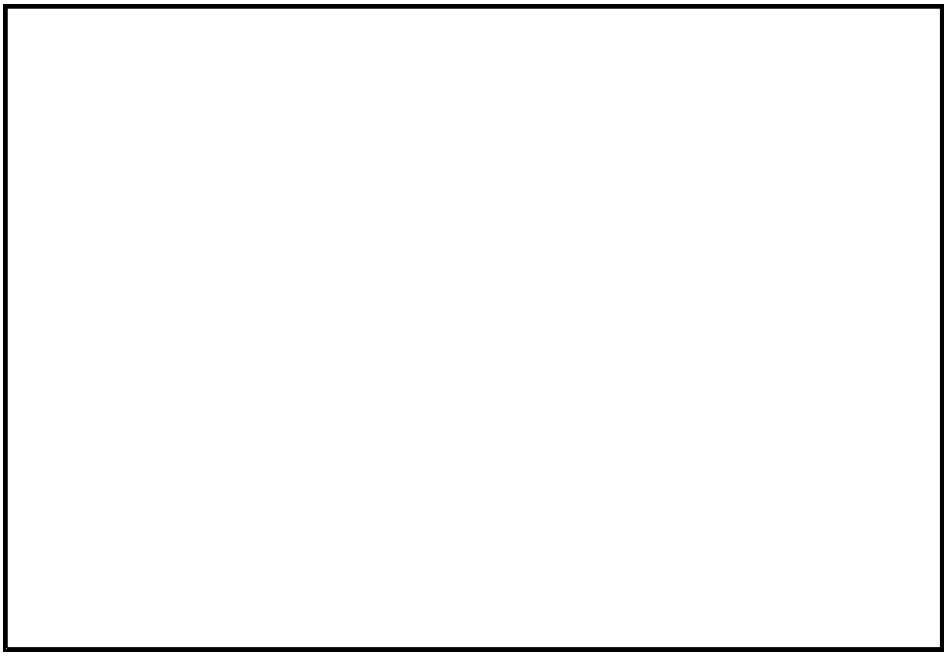


Photo 14: Cylinder Valve removed from dive cylinder

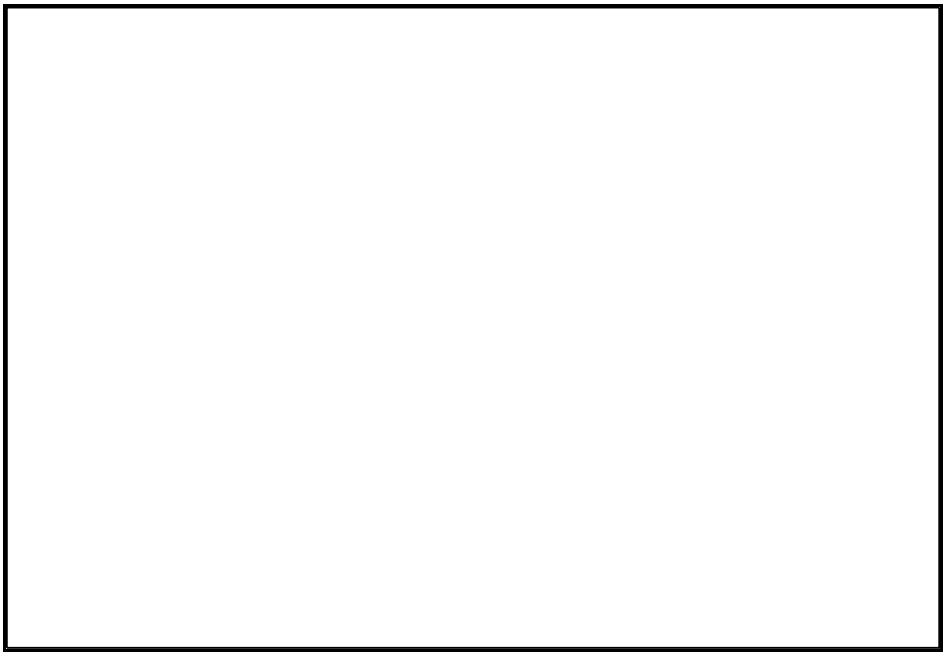


Photo 15: Close up of dip tube and dried deposits from interior of dive cylinder

5.3.16. Mr Angus NEWTON from ESR made the following comments regarding the debris around the valve stem and dip tube: "*The majority of the material from the dip tube, internal neck and solid fraction from the liquid consisted of aluminium and oxygen".*

5.4. Cylinder contents

5.4.1. Cylinders are usually filled to approximately 240 Bar (subject to valve) prior to use.

5.4.2. In this case, the working pressure/safe maximum filling pressure of the dive cylinder is 240 Bar. But the safe working pressure has been limited by the valve being rated to 232 Bar.

5.4.3. When spoken to by myself, Mr TOA advised, that prior to the dive *" We had maybe 240 to 250 Bar".*

5.4.4. After the Deceased was recovered onto shore, the dive gear was examined by a number of witnesses. Their comments are shown below:

5.4.5. Mr SYED stated: *"The tank was inspected for leaks, visually, no leaks found. The SPG was checked, it was reading about 100 Bar".*

5.4.6. Mr DAVIES stated: *"There were no audible air leaks…. I viewed the contents gauge, it read over 100 Bar. I am 100% certain that the content gauge read 100 Bar approximately".*

5.4.7. Mr John GRANSBURY stated: "*100bar remained in the tank according to her gauge".*

5.4.8. I do not believe the volume of air remaining to be a contributing factor in the death of Dr OSUNSADE, as there were sufficient cylinder contents for the Deceased to make her way out of the SS President Coolidge and swim underwater to the decompression area.

5.4.9. However, I believe there are concerns over the cylinder volume Dr OSUNSDE had for the planned dive duration, given she was at 41 metres, has died at approximately 14-15 minutes into her dive, and was a heavy air user, most likely due to being over weighted by her weight belt.

5.4.10. Assuming the dive plan on the fatal dive on Thursday 2 May 2013 was to 'The Lady', the planned bottom time was 25 minutes. Based off this I doubt that she would have sufficient cylinder contents to complete the dive.

5.4.11. I base this from her depth, bottom time at the time of her death and a subjective analysis of her rate of consumption of her cylinder contents.

5.4.12. For a bottom time of 25 minutes, I calculated that Dr OSUNSADE would have consumed 233 Bar of cylinder contents, leaving 7 Bar to swim up to the decompression stop areas, and for her to complete three decompression stops, totalling 25 minutes.

5.4.13. Given she was over weighted and would have an elevated breathing rate during her ascent, I believe Dr OSUNSADE would have run out of air at the time of her ascent. Given this information, she would have had to rely on the spare dive cylinder being carried by Mr TOA for her to swim to the decompression stop area, and for her to complete 25 minutes of decompression.

5.4.14. Had the dive been to the Doctors Office with a bottom time of 20 minutes, again Dr OSUNSADE would be in a similar predicament; as with increased depth, her consumption rate of cylinder contents would increase with depth proportionally, and again she would have run out of air inside the wreck of the SS President Coolidge, but this has not happened in this case.

5.5. Cylinder contents analysis

5.5.1. The cylinder was delivered to the Institute of Environmental Science and Research (ESR) for the purpose of having the contents measured and analysed against the New Zealand standard for breathing air AS/NZS 2299.

5.5.2. There was sufficient cylinder contents available, and an analysis found the cylinder contents did not comply with the New Zealand standard for breathing air.

5.5.3. Witness statements taken by me suggest the dive cylinder used by the Deceased was filled at Aquamarine by their dive compressor.

5.5.4. A copy of the ESR report for the Deceased is attached. See appendix 1.

5.5.5. Dr OSUNSADE's dive cylinder contents showed acceptable levels in all areas except for a moisture result content of higher than 130 ppm.

Comment: Moisture

5.5.6. The AS/NZS 2299 standards for air quality require a result less than 80 ppm.

5.5.7. A slightly higher moisture reading can be commonly found in some coastal filling stations or in tropical regions with high humidity. This will not prevent air supply to the diver or cause equipment failure.

5.5.8. Dr OSUNSADE's dive cylinder contents also showed elevated, but acceptable levels of carbon dioxide, with a test result of 333 ppm.

5.5.9. The acceptable level according to the AS/NZ 2299 is less than 480 PPM.

5.5.10. Whilst in Vanuatu in April 2014, I tested the ambient air at the Santo Police Station. There was no carbon dioxide detected.

Photo 16: Fresh air test

5.5.11. During a forensic analysis of the cylinder contents conducted by Environment of Science and Research (ESR), foreign debris was located inside the dive cylinder.

5.5.12. In total 50mls of a cloudy grey liquid was recovered from the inside of the dive cylinder.

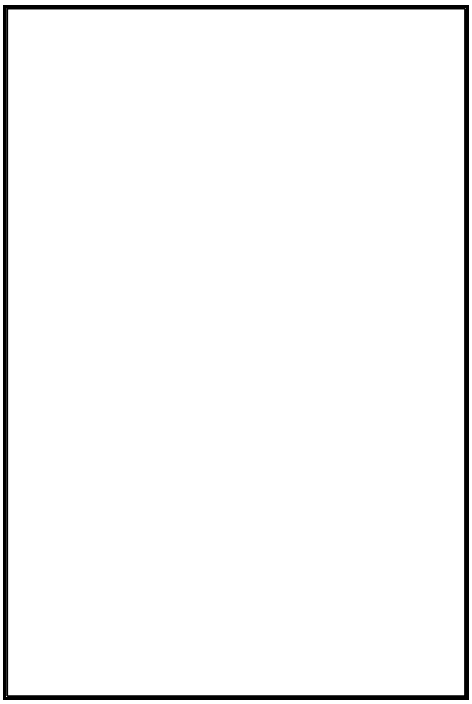


Photo 17: Free water found in dive cylinder by ESR

5.5.13. After the solid particles were filtered out from the liquid, 40mls of liquid and 895mg of a grey-coloured, very fine particulate were left over.

5.5.14. The particulate powder was a mix of particles containing silicon, aluminium and trace amounts of magnesium, sodium, potassium and iron.

5.5.15. This I suspect was due to some sort of foreign debris being introduced to the interior of the dive cylinder or through the type of cleaner Aquamarine was using, but I am unable to draw in any conclusion as to the exact source of these elements found by ESR.

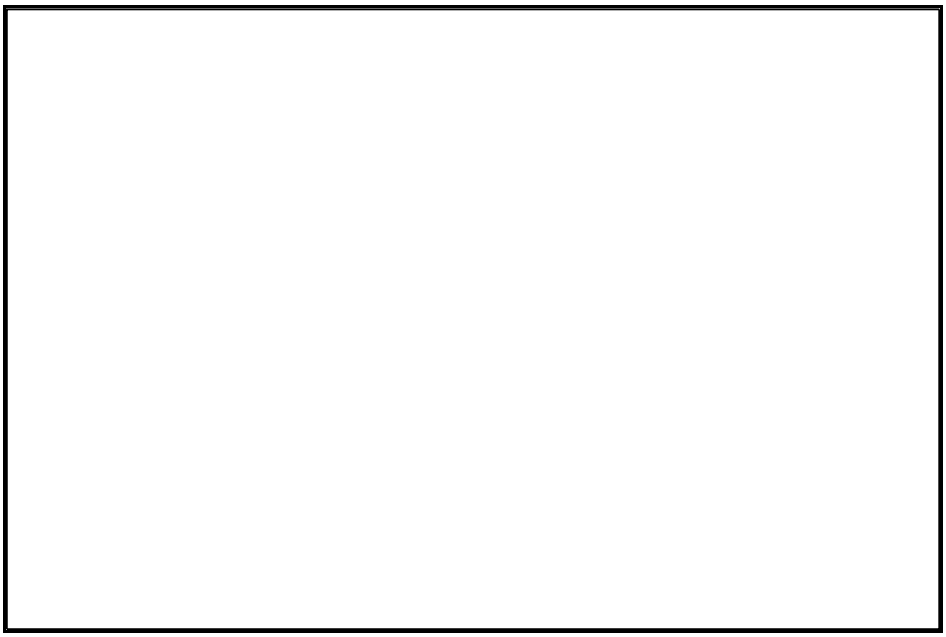


Photo 18: Particulate powder extract from dive cylinder

5.5.16. If Mr SYED is incorrect in his assumptions, it is more probable the only time cylinder examination was conducted is during the hydrostatic testing, which occurs every three years, or thereabouts, as shown from the cylinder stamps dated 2010 and 2013.

5.5.17. Allowing water to be present and rusting to take place is a dangerous situation, and is placing all divers who use such cylinders at risk. In the event of a blockage due to these particles blocking the dip tube from the valve or the regulator, the diver will experience an out-of-air emergency potentially at any time during the dive, should they get into an inverted/head down position in the water, if there were sufficient water volume to block the dip tube.

5.5.18. It is not just the volume of water, but the fact the cylinder pressure turns the water and aluminium solute into crystallized particles that will block air from getting to the diver. This will generally occur at the diver's first stage as the contaminants pass through the first stage regulators sinter filter.

5.5.19. When Mr Maurizio LA ROCCA was contacted by PNDS, he stated his regulators had been serviced one month prior to diving with Aquamarine, and he provided the following comment relating to loss of air whilst diving:

5.5.20. *"My 1st stage blocked with alloy powder from inside their tanks and stopped working at one stage and had to rely one my wife's Occy to get me to the surface".*

5.5.21. This comment from Mr LA ROCCA raises further concerns over the accuracy of Mr SYED's statement to me around dive cylinder visual and hydrostatic testing i.e. that Aquamarines dive cylinders are hydrostatically tested yearly and visually tested six monthly.

5.5.22. This also raises concerns over diving practices whereby dive cylinders that have been breathed down to low cylinder contents, are potentially allowed to go unchecked, predisposing them to water ingress and potentially placing more divers at risk of out of air scenarios when they have ample cylinder contents.

5.5.23. Testing conducted by PNDS on the dive cylinder Dr OSUNSADE was using has determined the quantity of liquid contained within the dive cylinder (50mls) was unlikely to have caused a blockage of the dip tube, or pass through to the regulator first stage.

5.5.24. Testing showed that 80 mls of liquid was required to affect the dip tube to risk a complete blockage. However, I believe with the degree of contaminants found in the dive cylinder, some foreign debris (alloy powder and salt water) could make its way into the regulator first stage if shaken about, and this could affect its operation.

5.5.25. Despite the quantity of liquid (50mls) in the dive cylinder Dr OSUNSADE was using, I do believe it to be a factor in the death of Dr OSUNSADE. Refer to section 5.8 – First Stage Regulator

5.5.26. I do not believe the quality of the air in Dr OSUNSADE's dive cylinder was a contributing factor in her death, although the moisture content was just outside New Zealand Standards.

5.6. Servicing of Compressor – Aquamarine Background

5.6.1. On 9 September 2009, Mr Rehan SYED purchased Aquamarine from the previous owners, Mr Kevin GREEN and Mr Barry HOLLAND.

5.6.2. Prior to Mr SYED purchasing Aquamarine, I am able to show the previous owners serviced the air compressors and dive gear used by tourists on a regular basis.

5.6.3. Records back to 2007 indicate the following parts being ordered through Pro-diving Services, New South Wales, Australia for the dive compressors:

- 03/08/2007 – Bare Coltri MCH16 compressor block – rebuilt
- 16/05/2008 – Service to additional MDE filter for the MCH16 standard compressor. Spare hoses, valves and intake filter elements. Compressor oil.
- 03/09/2008 – Spare O-rings
- 07/01/2009 – MCH16 Compressor block sent to us for repair: Serial number 1659780161
- 16/03/2009 - Spare O-rings and spare filter felt pads
- 08/04/2009 – New electric motor, spare high pressure hoses and spare O-rings
- 26/06/2009 – Spare condensate drain valves
- 07/08/2009 – Spare felt pads for filters
- 12/06/2010 – Felt pads for filter repacking
- 23/06/2010 – New 1st stage valve plate assembly, new piston rings for 1st and 2nd stages, new final stage piston and liner with rings, spare felt pads, spare HP filter element, spare 2nd and 3rd stage discharge valve O-rings

5.6.4. After 23 June 2010, no air filter parts were ordered by Aquamarine directly through Pro-dive Services until after the fatal dive.

5.6.5. After Dr OSUNSADE's death, the following parts were ordered by Aquamarine, and are as follows:

- 07/05/2013 – Compressor oil, felt pads for filters, filter drain bleeder seats, filter drain bleeder screws, air quality test kit with packs of test tubes for: CO2, CO, H2O and oil mist

- 04/04/2014 – Compressor oil, 1st stage piston with rings and gudgeon pin and little end bearing, final stage piston and liner assembly with rings, con rod for piston, fill control valves

5.6.6. I have concerns over the potential lack of servicing of the air compressor between mid-2010 and the fatal dive in May 2013. Also there are issues that have been reported to me during the course of this investigation, outlined below.

5.6.7. Miss Kali CHAMBERLIN, who used to work at Aquamarine for six to 12 months from August 2010, was interviewed by me in March 2014. During the interview, she provided third hand information that on one occasion staff from Aquamarine were low on compressor oil, after a repair to the compressor. As a result, used engine oil was used to top up the air compressor. Miss CHAMBERLAIN learnt of this information through dive guides who used to work for Santo Island Dive and Fish, who had spoken to dive guides from Aquamarine. Miss CHAMBERLAIN was unable to recall who the dive guides were.

Comment:

5.6.8. Oil for air breathing compressors needs to be of a special type. Automobile oil is not suitable to be used in air breathing compressors and is at the least carcinogenic.

5.6.9. This caused the compressor to emit smoke, and required the compressor to be drained of oil.

5.6.10. This allegation is corroborated by Mr Malcolm DAVIES, owner of Santo Island Fish and Dive, who stated that on an occasion not long after Mr SYED purchased Aquamarine, he had to assist with a repair on an air compressor. At the end of the repair Mr DAVIES left, advising the air compressor had to be topped up with compressor oil.

5.6.11. According to Mr DAVIES, he received a call later than day from Mr SYED claiming his air compressor was blowing black smoke.

5.6.12. Mr DAVIES went to Aquamarine and was shown a yellow metal drum which was found to contain engine oil, that had been used to top up the air compressor.

5.6.13. According to Mr DAVIES, he received this information from an unknown person who was an Aquamarine employee, one of Aquamarine's staff showed Mr SYED the correct oil which should have been used. It is not known who this person is who showed Mr SYED the correct oil.

5.6.14. Further evidence of general lack of servicing for the dive compressors, and rental dive gear can be found from Mr Michael BATCOCK's statement.

5.6.15. Mr BATCOCK worked for the previous owners of Aquamarine; Mr GREEN and Mr HOLLAND. When Mr BATCOCK returned to work for Aquamarine in 2010, he found Aquamarine was being managed by the new owner Mr SYED.

5.6.16. Whilst working for Mr SYED at Aquamarine, Mr BATCOCK had a concern over the air compressors used by Aquamarine. Mr BATCOCK made the following comments:

5.6.17. *"In April 2010 I returned to Santo to work for Rehan*. *One of the three dive air compressors had a fault with the piston seals, which was due to a lack of oil maintenance, because of Rehan refusing to buy oil for the compressor"*

5.6.18. *"The dive compressor hours for the filters were okay though and Gregory {Gregory VOHOVEN} was changing them maybe every 40 hours and we also kept service records of when the dive compressor was serviced. At Aquamarine, we never had temperature or humidity gauges on the compressor. For example here at Coral Quays we have an electronic temperature gauge, and we use the average filling temperature to determine how many hours the filters need to be changed. At Aquamarine, this was basically guesswork, and the filter hour changes came down to hours only based on an assumption of heat. As time went on, the filter hours went up, as there was diminishing stock of molecular sieve, activated carbon and pads. This decision to increase the hours was made by Rehan. We apposed this, and he told us to see how long we could get out of the filters. At this stage, no-one was complaining of bad air though. We did however find an ever increasing build-up of white residue on the first stage regulator filters".*

5.6.19. *"After the first compressor failed, not long after this the second compressor failed. I was not qualified to rebuild compressors, just qualified to maintain it, i.e. changing oils and filters etc. I requested from Rehan to bring in a compressor specialist to fix the problem. He refused and decided to do it himself. Rehan asked a friend to give him a hand to rebuild it himself. It was about this time, that Malcolm DAVIES became involved in fixing one of the other faulty compressors. Malcolm only did work on one compressor, working on the valves and the cooling pipes, but used parts from the other broken compressor, I think. I never had any issues with foul air, because I always kept the servicing up to date, up until when I left in July 2011.*

5.6.20. Enquires by PNDS reveal the following from Pro-Diving Services Pty Ltd. Pro-Diving Services Pty are distributors of dive compressors and parts.

5.6.21. Mr Richard POOLE from Pro-Diving Services provided the following comments:

5.6.22. *"No training certificates had been issued, however the original owner of the company did get basic training in filter and oil changes".*

5.6.23. *"The Operators manual is formatted so as to show owners of the compressors on how to change filters and do filter changes".*

5.6.24. *"In essence Owner / Operators usually do the basic service requirements such as oil and filter changes".*

5.6.25. *"This is a common practice and the Operator's manuals show the how to do this".*

5.6.26. *"When it comes to mechanical work some operators do this without training, some with technical support, whilst others have a Technician come and do the service or send it to a workshop".*

5.6.27. When Mr POOLE was asked to comment on the servicing of the air compressors, Mr POOLE provided the following comments:

5.6.28. *"I believe the compressor system in question has 2 x MCH16's within the cabinet (Model MCH32), thus each compressor would require its own individual servicing".*

5.6.29. *"I also think they could have been operating a Standard MCH16 as shown on page 60 of the User Manual (with additional MDE filtration)".*

5.6.30. *"In regards to servicing it is important to note as an example that a 500 hour service should also incorporate the 5, 10, 50 and 250 hour checks not just the work in the 500 hour column".*

5.6.31. *"In regards to High pressure filter element servicing you will note the significant reduction in filter life in relation to operational ambient temperatures".*

5.6.32. *"The correction factor is clearly shown and in regards to the MCH16 filter requirements at 20 degrees C it shows a filter change at 40 hours".*

5.6.33. *"With an increase in temperature to 30 degrees C it then recommends a change at 23 hours".*

5.6.34. *"At 40 degrees C it is reduced to 14 hours".*

5.6.35. *"Of course this also depends on how the compressor is maintained as poor maintenance could even reduce filter life further especially if there is oil carry-over or if the filter drains are not operating correctly".*

Comment:

5.6.36. If a dive compressor is housed indoors, the ambient temperature will generally be higher than that recorded outdoors. During the investigation Mr SYED prevented me from inspecting his dive compressors despite my repeated requests.

During an initial meeting with Mr SYED, I went to Mr SYED's house, and briefly saw a dive compressor in operation from a distance, off to the side of the house.

There appeared to be dark coloured pipes running from what is assumed to be a water trough back towards the air compressor. It is not known if this is a home-made attempt to create a water cooler for the air, prior to it being compressed.

The following table shows the average temperature readings for Espiritu Santo.

Average temperature per month

Figure 3: Average temperature per month

Tabular view for temperature and precipitation per month

Months	Normal	Temperature	
		Warmest	**Coldest**
January	26.1°C	31.2°C	20.7°C
February	26.6°C	31.4°C	21.1°C
March	27.0°C	31.7°C	21.8°C
April	27.0°C	31.6°C	22.0°C
May	27.7°C	32.7°C	22.6°C
June	27.9°C	32.6°C	23.0°C
July	27.9°C	32.7°C	22.8°C
August	28.3°C	33.8°C	22.9°C
September	28.3°C	34.0°C	22.7°C
October	27.6°C	33.0°C	22.0°C
November	26.7°C	31.9°C	21.7°C
December	26.2°C	31.1°C	21.0°C

5.6.37. Based off the MCH16 servicing manual, with an average hottest temperature in May of 32.3º, the air filters should be changed every 14 hours, and the average normal temperature in May of 27.7º, the filters should be replaced every 23 hours.

Comment:

5.6.38. According to Mr BATCOCK, air compressor filters were changed “maybe every 40 hours”. If this were correct, the filters were being used well past their recommended service life.

Mr BATCOCK also stated that Mr SYED requested his staff to extend air filter hours.

Mr SYED was interviewed by me on 6th March 2014. During the interview, Mr SYED advised his servicing hours for the air compressors filter were at intervals of 20 hours, and that the servicing was recorded in a log book.

Mr SYED was asked by me to produce his service records on several occasions for the dive air compressors, but failed to do so, advising me that he had recently moved and he did not know where the service records were.

Accordingly, I am unable to verify Mr SYED’s authenticity in relation to the service history of both dive compressors.

Based off Mr BATCOCK’s statement, the air filters in the compressor at Aquamarine were being used well in excess of the recommended time frames for air filter replacement.

This is a dangerous practice and limits the ability of the air filter to remove various elements from the air, which if breathed from a diver at depth, could be toxic.

5.6.39. According to witness statements from Mr John GRANSBURY and Mr Martin WILLIAMS, it is believed Aquamarines dive compressor(s) have been at Mr SYED's house since approximately January/February 2012. Mr SYED is unable to locate a compressor log book that should be filled in each time the compressor is used.

5.6.40. At the very least, the service log book has to be filled in during each service.

5.6.41. Mr WILLIAMS was asked to comment on the air compressors at Aquamarine, his response was: *"One was broken and waiting for parts to come from Australia. The other was working but air was moist. Rehan blended his own Oxygen for nitrox diving and did not have the correct gauges to do this. I can remember taking a group out for 2 dives and the tour leader had testing equipment to test the Nitrox mixture and at least half of the tanks had too much oxygen in them for the dive and skill level for the group".*

5.6.42. Mr WILLIAMS was asked to comment on the filling of dive cylinders at Aquamarine, his response was: *"I did not fill any cylinders but did notice they did not fill them in a bath of water to cool the tanks. The compressors were old, one not working, one over worked. In the month I was there the filters never got changed".*

5.6.43. Mr WILLIAMS was asked to comment on air quality concerns at Aquamarine, his response was: "*Yes I did encounter foul air and received complaints. I got a sore throat/infection from the air in the tanks as I was using them every day. Once they had been clean with the glass balls and bleach they improved".*

Comment:

5.6.44. Bleach is not a recommended cleaning product for cleaning the interior of a dive cylinder. Recommended cleaning product is very hot water or as per the manufacturers recommendations.

5.6.45. Mr WILLIAMS was asked to comment on stage/deco dive cylinders with faults/issues, his response was: "*Yes there were reports and I had seen leaking tanks for the stage/deco cylinders. The regulators also leaked at times".*

Comment:

5.6.46. I believe the above information suggests a lack of regular servicing. Given the nature of the depths involved and wreck penetrations, the dive gear should be in excellent working order, and detailed records kept of the work done, parts fitted and who completed the service.

5.6.47. Although the compressor is not directly connected to this death, the cylinder used by the Deceased was filled by it, and contained raised moisture levels, elevated carbon dioxide, and free water/corrosion particles. The lack of maintenance of the dive compressor is also consistent with that of the equipment used by the Deceased, which was supplied by Aquamarine.

5.7. Regulator

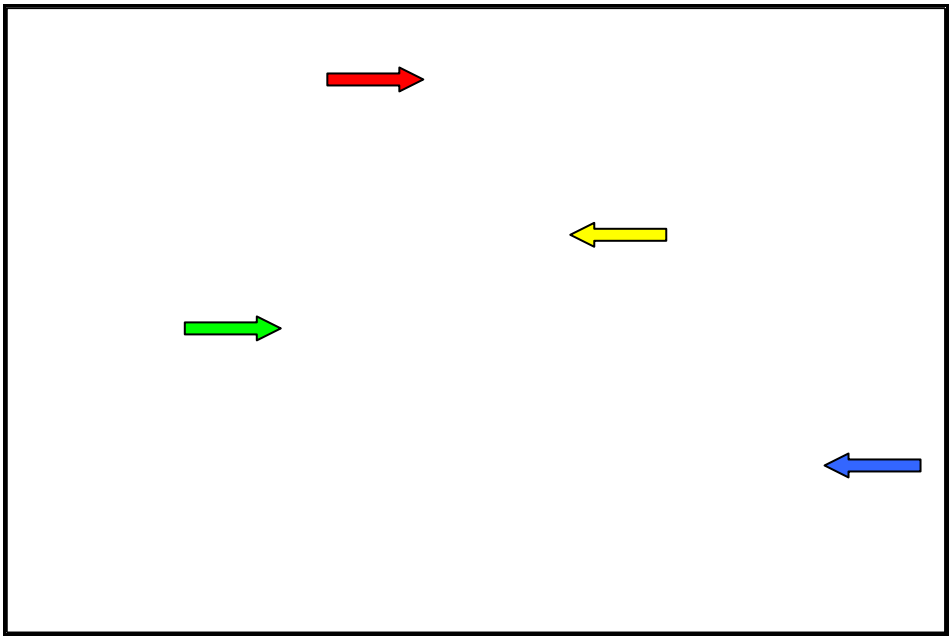


Photo 19: Regulators

Red arrow indicates first stage regulator
Blue arrow indicates submersible pressure gauge and cylinder contents gauge
Green arrow indicates primary second stage regulator
Yellow arrow indicates alternate second stage regulator

5.7.1. The regulators were received by me detached from the dive cylinder, but still attached to the BCD.

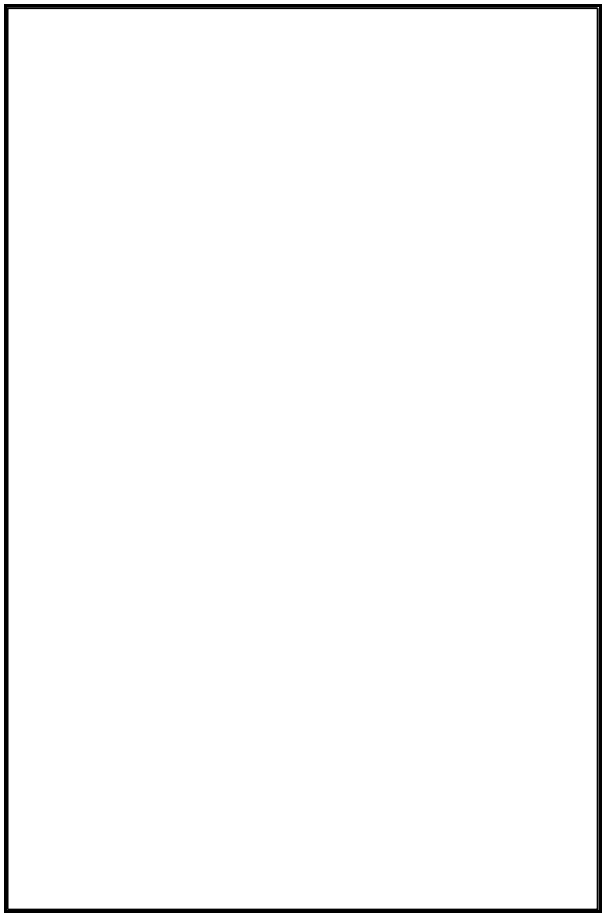


Photo 20: Dive gear as stored in Vanuatu

5.7.2. Enquiries reveal Dr OSUNSADE's regulators were disassembled from the dive cylinder and BCD by local dive operators during the subjective air quality testing.

5.7.3. Visually Dr OSUNSADE's regulators, appear to be in a satisfactory condition, apart from the build-up of some verdigri deposits.

5.7.4. The regulators were owned by Aquamarine.

5.8. First Stage Regulator

Make:	Oceanic
Model	CDX5 - DVT
Colour:	Silver
Serial:	01225433
Age:	29/06/2012

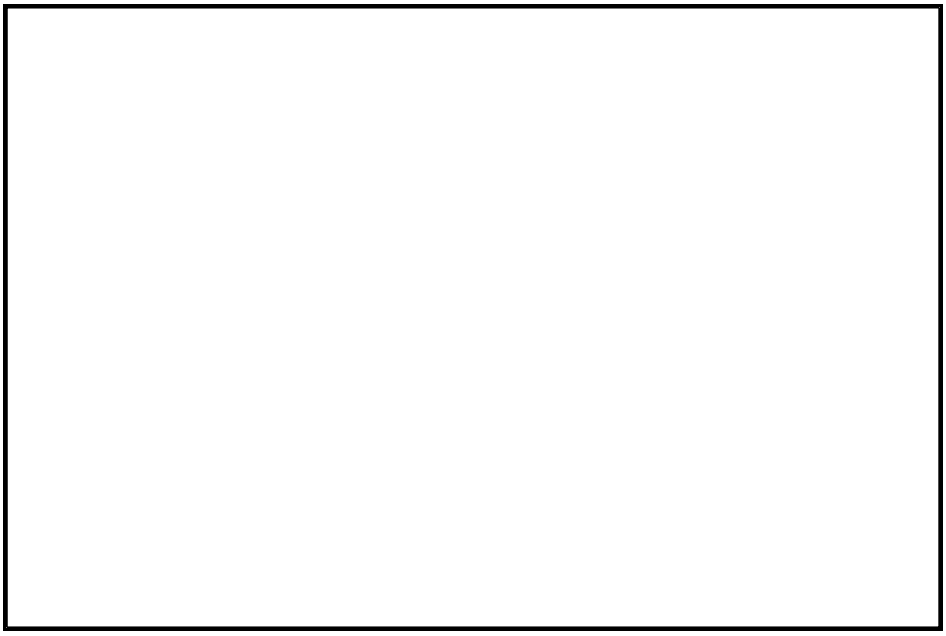


Photo 21: Side view of first stage regulator

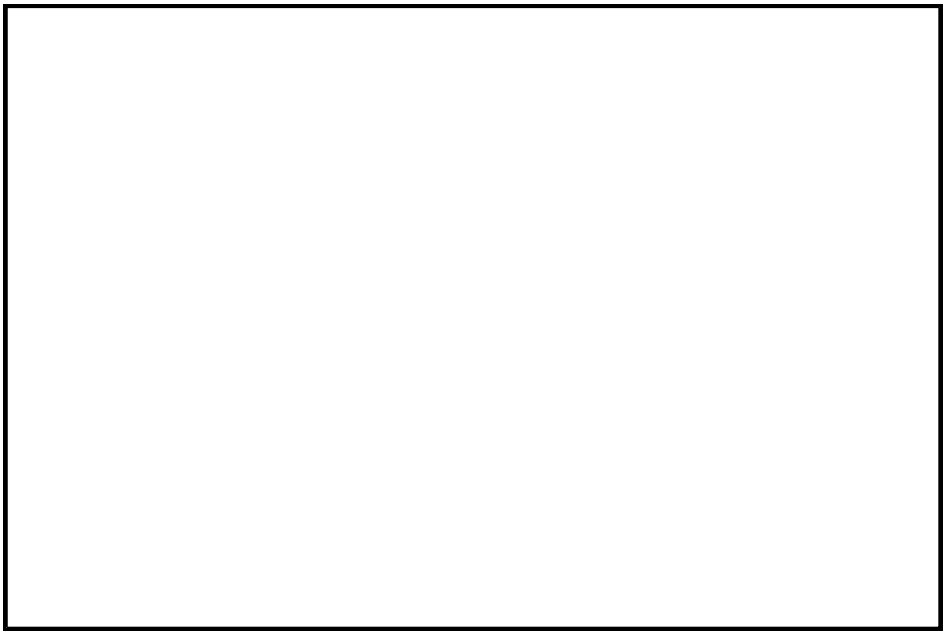


Photo 22: Side view of first stage regulator

Two photos above show some verdigri deposits which indicates poor post dive cleaning

5.8.1. The role of the first stage regulator is to attach to the cylinder valve and alter the high pressure in the cylinder (up to 240 Bar / 3480 PSI), to a lower working pressure known as the ‘intermediate pressure’ for the second stage regulator.

5.8.2. In turn, the first stage regulator delivers air to the second stage regulator and the diver’s mouth, on demand, as the diver inhales.

5.8.3. Tests on the first stage regulator in Vanuatu by myself produced an intermediate pressure of 137 PSI, with no creep when left for five minutes.

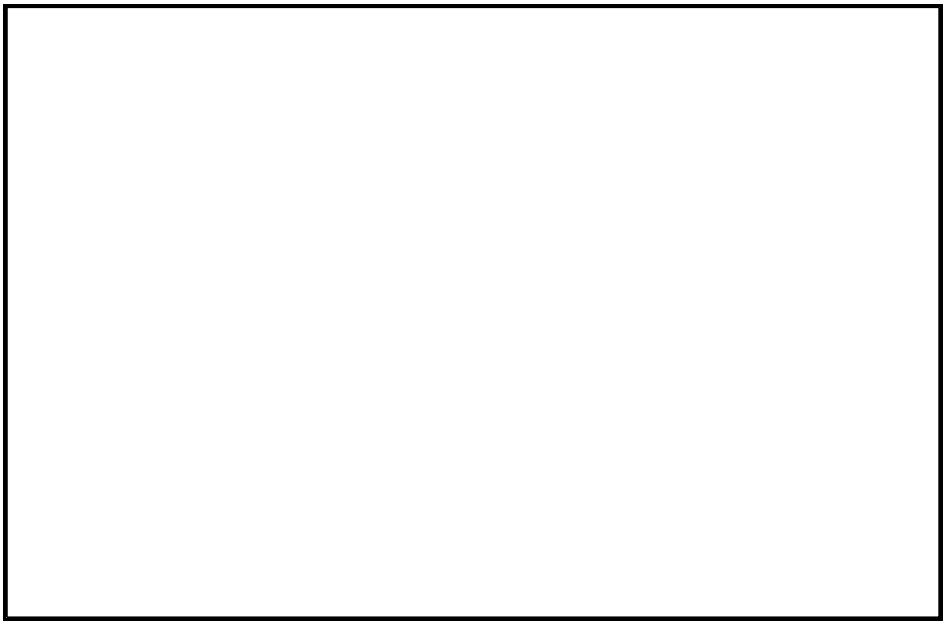


Photo 23: Intermediate pressure test

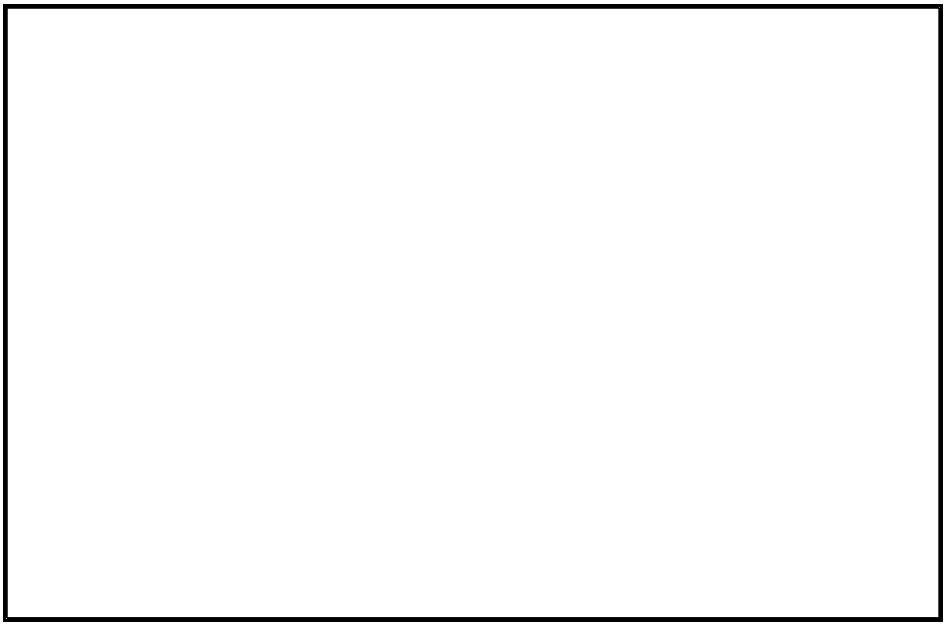


Photo 24: Close up of intermediate pressure

5.8.4. Forensic testing in New Zealand by Air Technology Limited, Auckland found the regulator used by Dr OSUNSADE provided the following test results:

- "*Intermediate pressure:*
  - *140 PSI at 50 Bar*
  - *140 PSI at 200 Bar"*

Test Dive:

5.8.5. A test dive was completed by me using Dr OSUNSADE's equipment on August 2014.

5.8.6. Whilst in the water the first stage regulator provided satisfactory results at both six metres and at 19 metres. During the test dive, both the primary and alternate regulators did not perform as well as expected and were noted to require the diver to breathe slightly harder than expected

5.8.7. During the initial examination of the first stage regulator, I was unable to ascertain the state of the sinter filter due to the design of the first stage regulator.

5.8.8. PNDS completed a subsequent flow test on the first stage regulator and both the primary first stage regulator and alternate second stage regulator provide flow results of 24 Standard Cubic Feet per Minute.

5.8.9. When this test was repeated, with the primary first stage regulator attached to the flow metre, and the alternate second stage regulator was purged, the flow rate started at 16.1 Standard Cubic Feet Per Minute, but then dropped to 0. This is not an acceptable result and suggests a lack of servicing/debris build up inside the unit.

5.8.10. This test was repeated with the alternate second stage regulator attached to the flow metre. The test result showed an initial reading of 20 Standard Cubic Feet per Minute, but again dropped to 0 when purged for extended periods.

5.8.11. This result is not acceptable, and suggests a lack of servicing of the first stage regulator.

5.8.12. In the scenario of a diver under stress, such as Dr OSUNSADE being over weighted, with incorrect fitting dive boots and fins, as well as being separated from their dive guide inside a wreck at depth, this could cause the diver to breathe fast enough to effectively have a scenario of an inadequate supply of air for their high work effort.

5.8.13. Subsequently, PNDS stripped the first stage regulator, only removing the inlet side of the yoke.

5.8.14. The following is a summary of our findings with pictures to illustrate what was found:

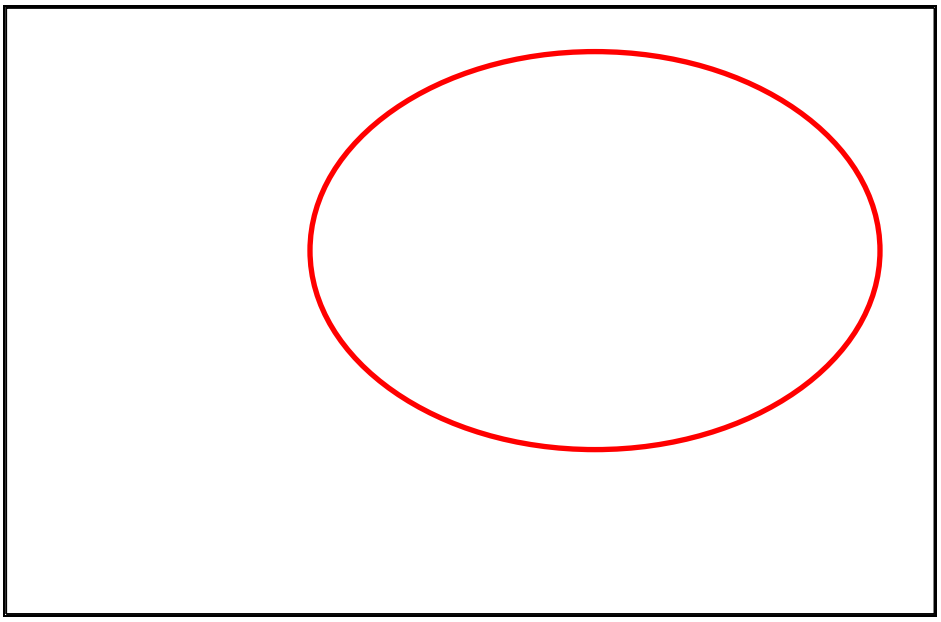


Photo 25: Deceased's regulator first stage with all hoses removed.

Red oval indicates parts removed from the regulator.

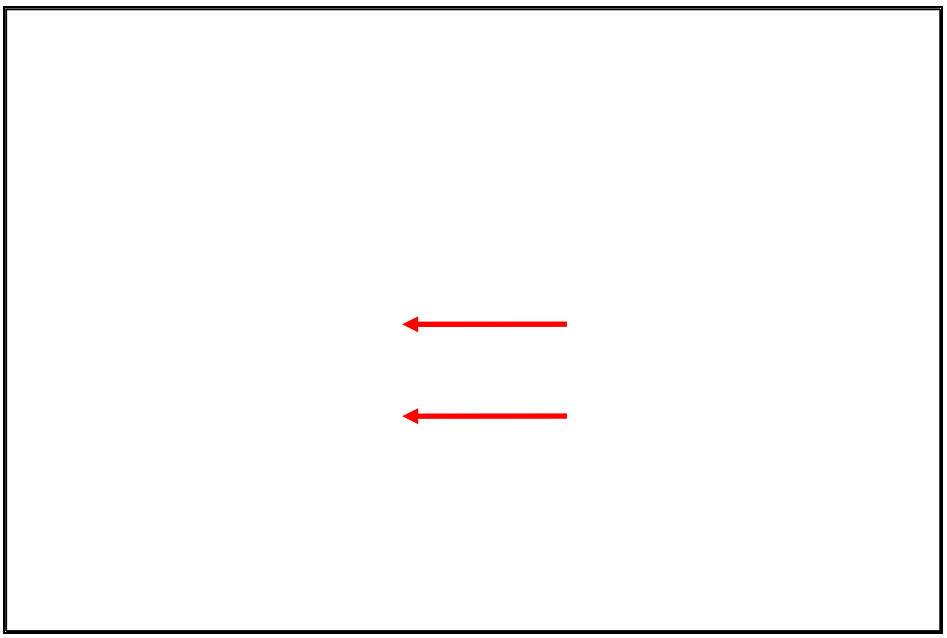


Photo 26: Deceased's equipment removed from body of the first stage.

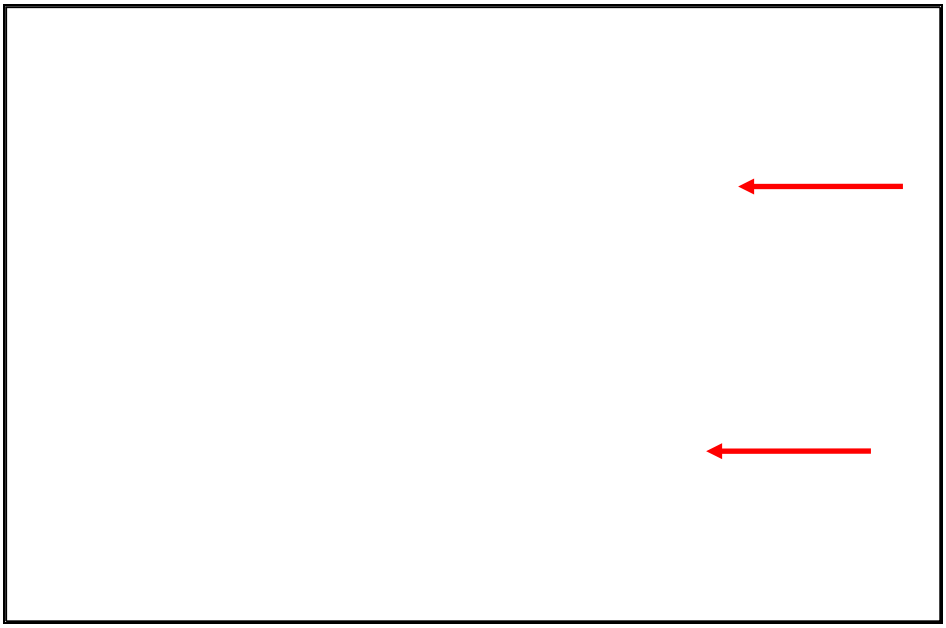


Photo 27: Deceased's equipment with auxiliary parts removed.
Arrow indicates the face of the regulator that attaches to the cylinder valve

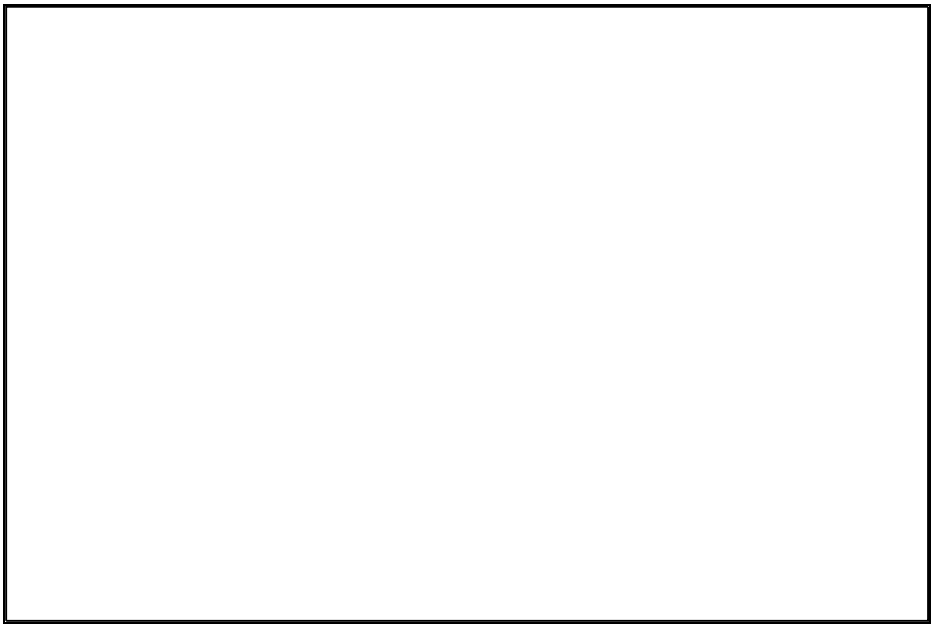


Photo 28: New equipment with auxiliary parts removed

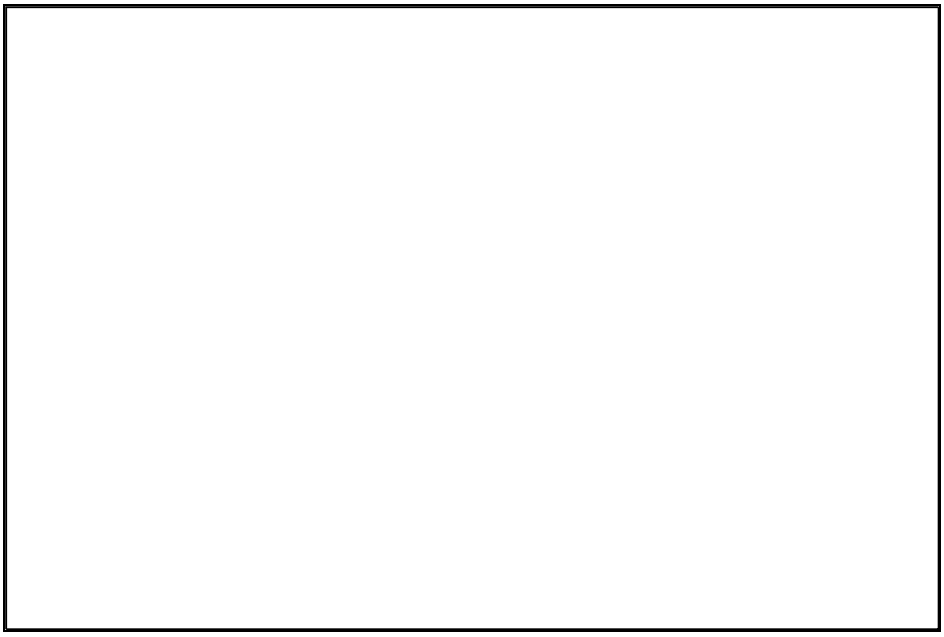


Photo 29: **Deceased's equipment with auxiliary parts removed, looking into body showing O-Rings and sinter filter**

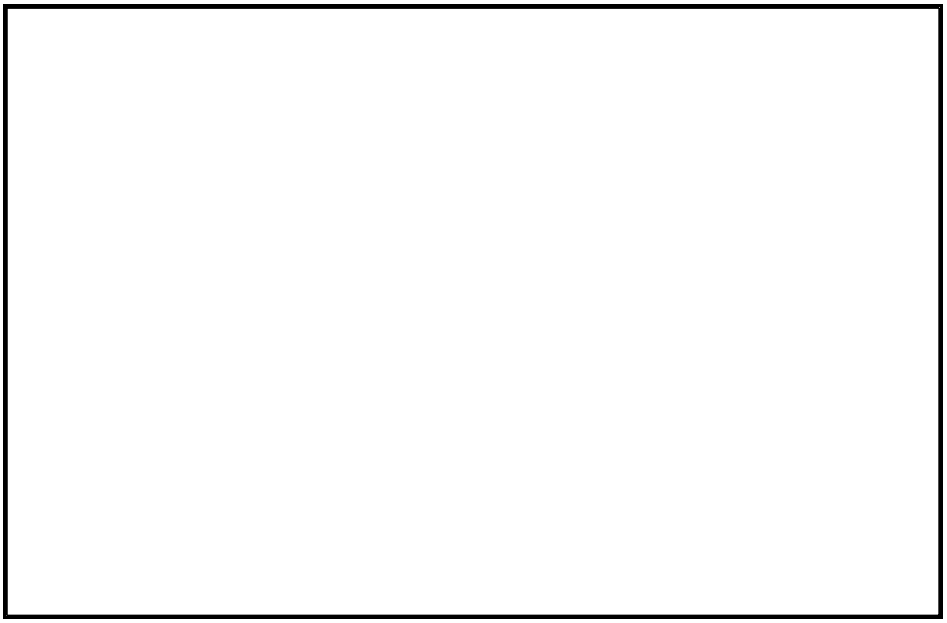


Photo 30: New yoke, with new O-Rings and new sinter filter.
In comparison this is a new yoke with new O-Rings and new sinter filter. This would be the similar representation for a used regulator.

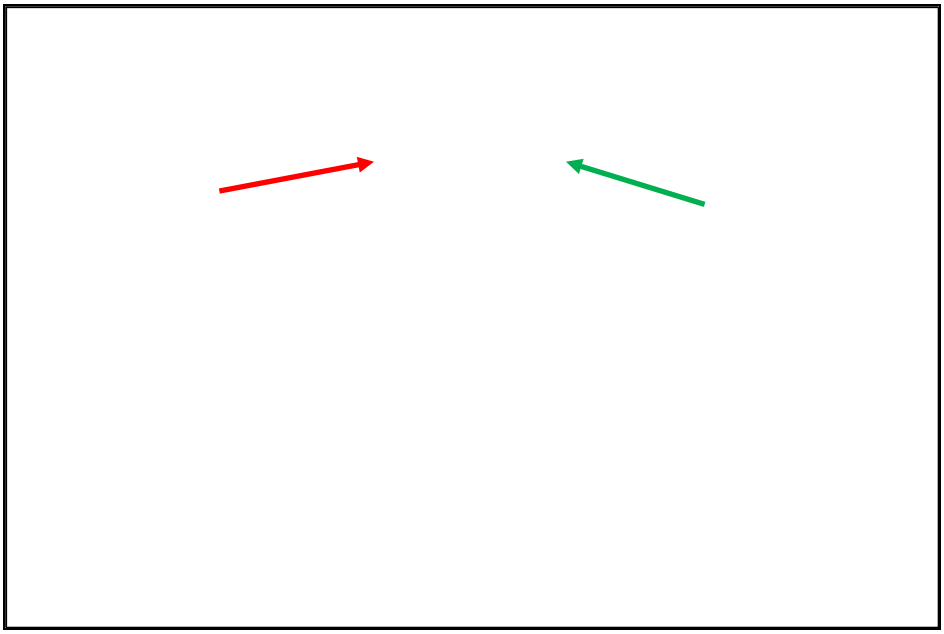


Photo 31: Deceased's equipment.

Above picture shows sinter filter removed and the first O-Ring removed (as indicated by red arrow – lip can be seen where O-Ring would sit), second O-Ring partially removed (as indicated by green arrow).

Note: White powder build up should not be present.

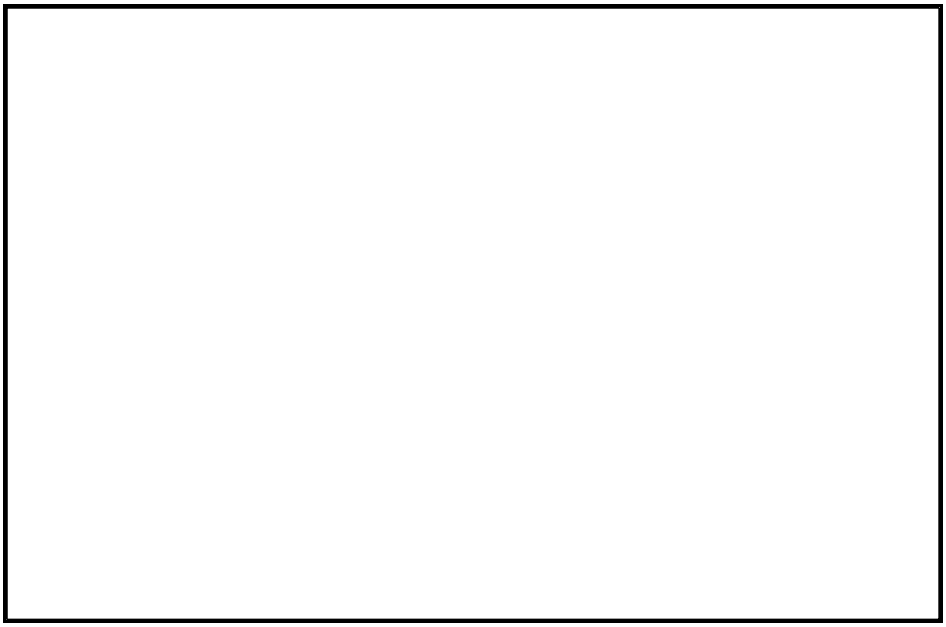


Photo 32: New yoke, with new O-Rings and new sinter filter.

This would be the same state for a used regulator.

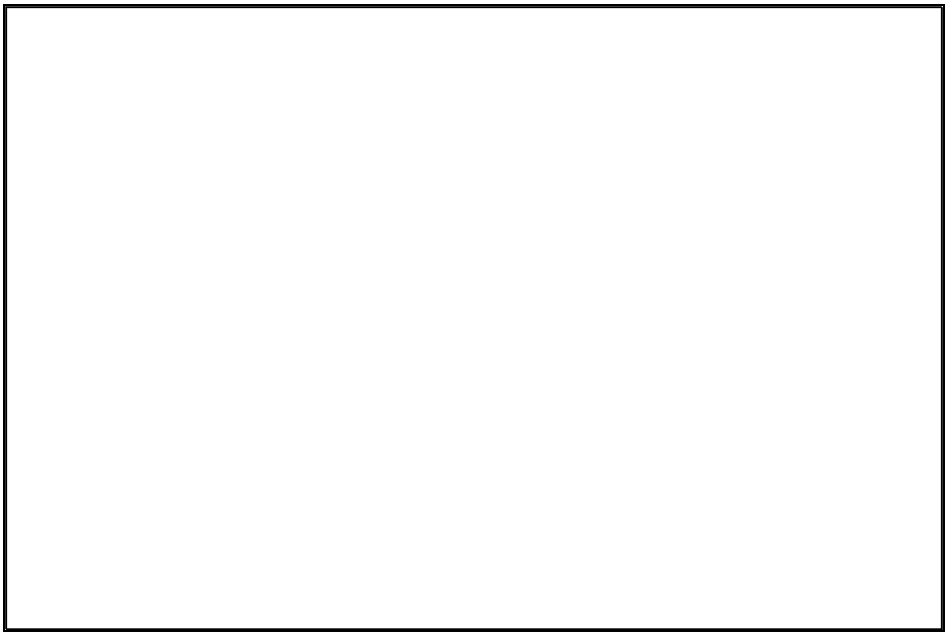


Photo 33: Deceased's equipment - close up of sinter filter severely blocked.

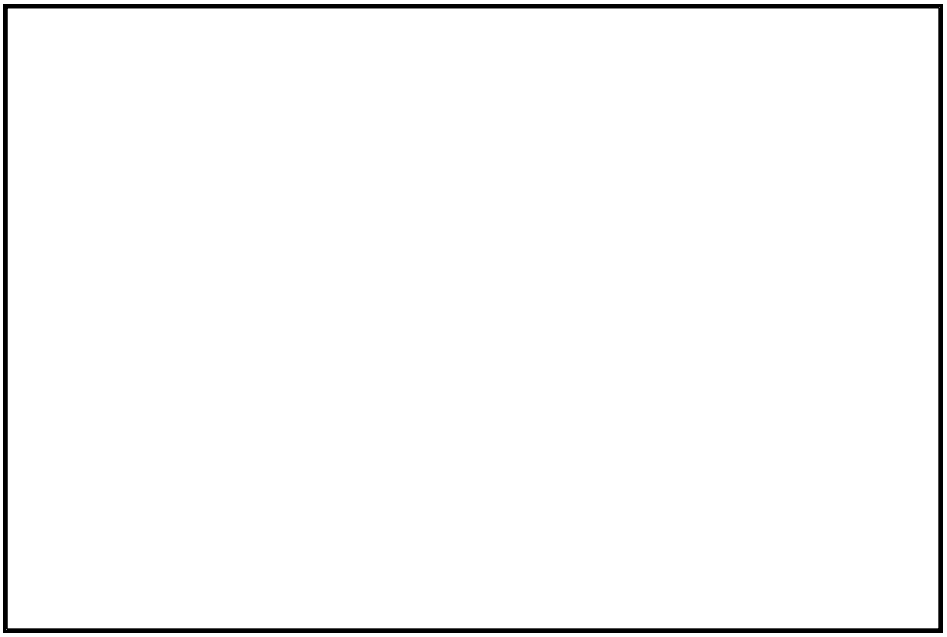


Photo 34: New sinter filter

This would also be a good representation of a regulator that has good air fills, and no water debris and/or aluminium oxide build up in the dive cylinder being picked up and taken through the sinter filter/regulator assembly.

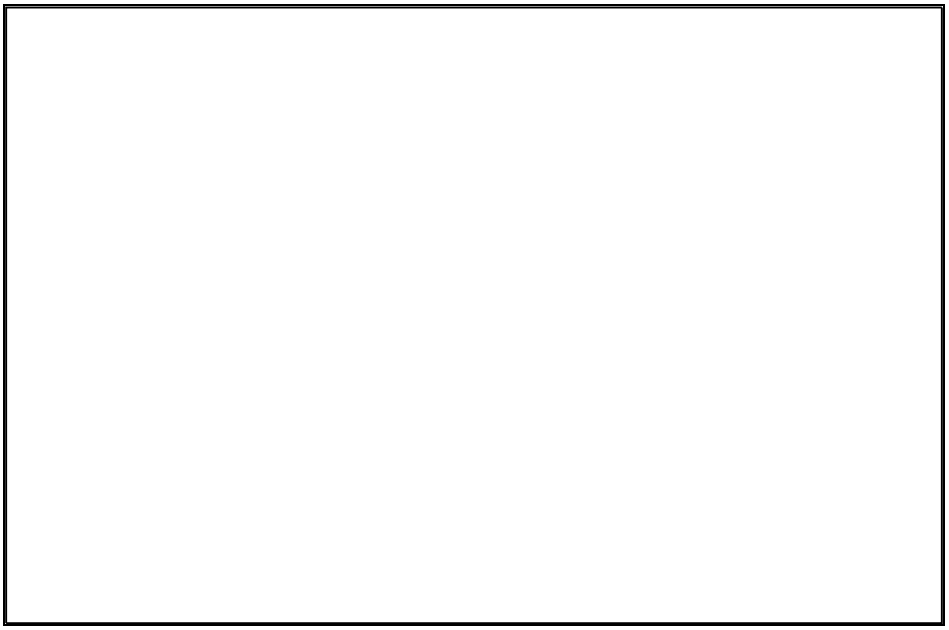


Photo 35: Deceased's equipment - assembly completely disassembled.

Third O-Ring (as shown above), was located jammed between the sinter filter and the housing body (right of picture) and the spring. The third O-Ring should not have been part of the assembly.

Photo 36: New yoke with new/cleaned parts.

There should be no or minimal build-up of debris.

5.8.15. The above findings are not acceptable and indicate that debris from the Deceased's or other dive cylinders over time have been picked up by the dip tube inside the dive cylinder, resulting in the sinter filter becoming severely compromised.

5.8.16. For this to occur, based off testing by PNDS, there would have to be 80 mls of fluid inside the dive cylinder for the salt water and aluminium oxide to enter the first stage regulator and block the sinter filter, if perfectly still. But with movement, it is feasible for water/debris to be picked up by the dip tube, with less than 80 mls inside the dive cylinder.

5.8.17. The build-up of salt water and aluminium oxide in excess of 80 mls in other dive cylinders over time entering the first stage, would explain the poor results seen in the flow test in the regulators that Dr OSUNSADE used. It is believed with a new sinter filter fitted, the regulators would perform better in the flow test, but the entire unit would require servicing.

Comment:

5.8.18. Back in 2010, Mr BATCOCK was asked to extend the filter hours of the dive compressors by Mr SYED, and during that time he noted after that occurred, an increase of white residue was found on the sinter filters of the regulators belonging to Aquamarine.

5.8.19. Also, when Mr LA ROCCA was diving with Aquamarine at the same time as Dr OSUNSADE, he had a complete loss of air supply after he went into a head down position at the end of his dive.

5.8.20. This would mean that Mr LA ROCCA would have probably had in excess of 80 mls of salt water and/or aluminium oxide build up inside the dive cylinder he was using from Aquamarine.

5.8.21. When Mr LA ROCCA was contacted by PNDS, he reported that his first stage was full of white powder, and had been serviced just prior to this trip.

5.8.22. Mr LA ROCCA was using dive cylinders from Aquamarine.

5.8.23. I believe the state of the first stage regulator could have been a contributing factor in the death of Dr OSUNSADE by affecting/reducing her air supply. This would have been compounded when she was at a depth of 40 metres, in conjunction with other factors including excess weight, ill-fitting dive boots, ill-fitting / loss of fins, inexperience, becoming separated and panic.

5.8.24. The performance of the regulator to supply air would be compromised and the Deceased would simply not get enough air, and become hypoxic. This leads to:

- Light headiness
- Fatigue
- Numbness
- Nausea
- Confusion
- Disorientation
- Hallucinations
- Severe headaches
- Reduced level of consciousness

5.8.25. If these are encountered by the diver, the risks are potentially death.

5.9. Primary Second Stage Regulator

Make:	Oceanic
Model:	CT3 - Adjustable
Colour:	Black
Serial:	00446691
Age:	29/06/2012

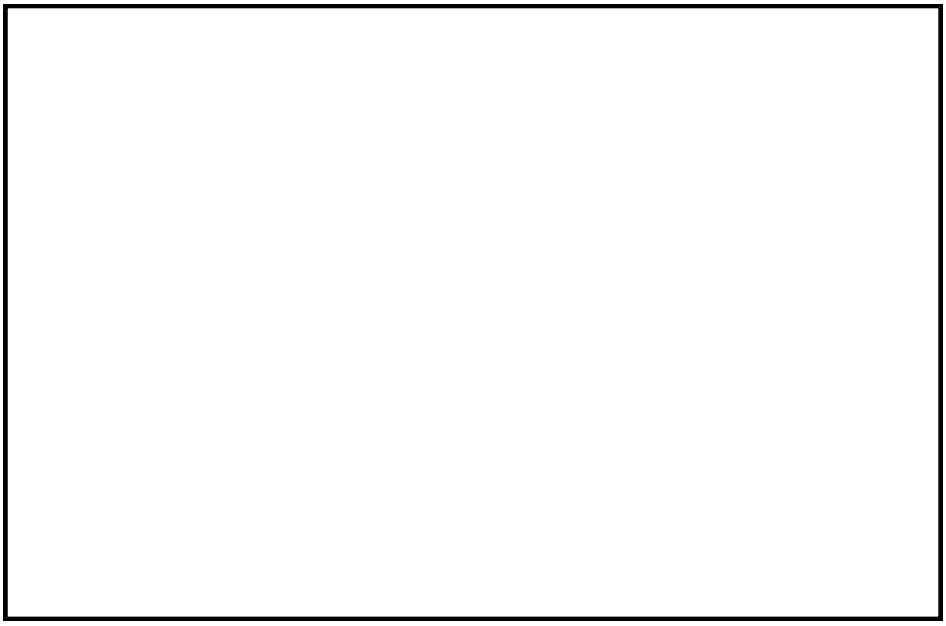


Photo 37: Primary Second Stage Regulator

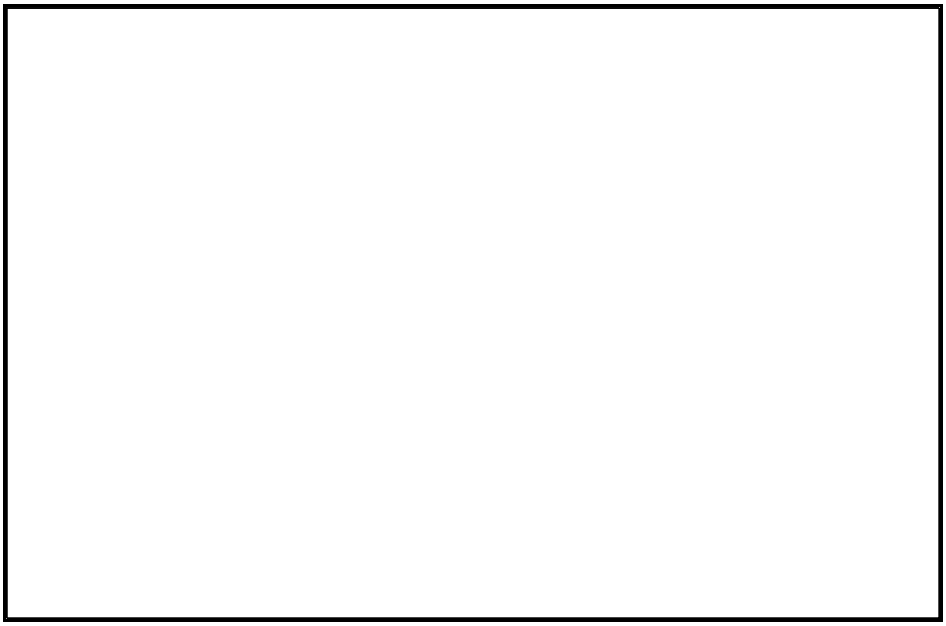


Photo 38: Primary Second Stage Regulator

5.9.1. The role of the primary second stage regulator is to deliver air at a breathable pressure to the diver, on demand as the diver inhales.

5.9.2. This regulator body was in a sound condition and did not have any visible damage.

5.9.3. The diaphragm on Dr OSUNSADE's primary second stage regulator was free from any notable damage.

5.9.4. The primary second stage regulator also allows the diver to exhale through a mushroom exhaust valve located in the second stage body, which also prevents the diver inhaling water.

5.9.5. All second stage regulators should provide a vacuum seal. This means that a diver should not be able to suck air through either of the second stage regulators when turned off / no air supply.

5.9.6. An examination by myself in Vanuatu found that inside the primary second stage regulator body, the mushroom valve was seated correctly, there was no damage or debris present and it provided a vacuum seal.

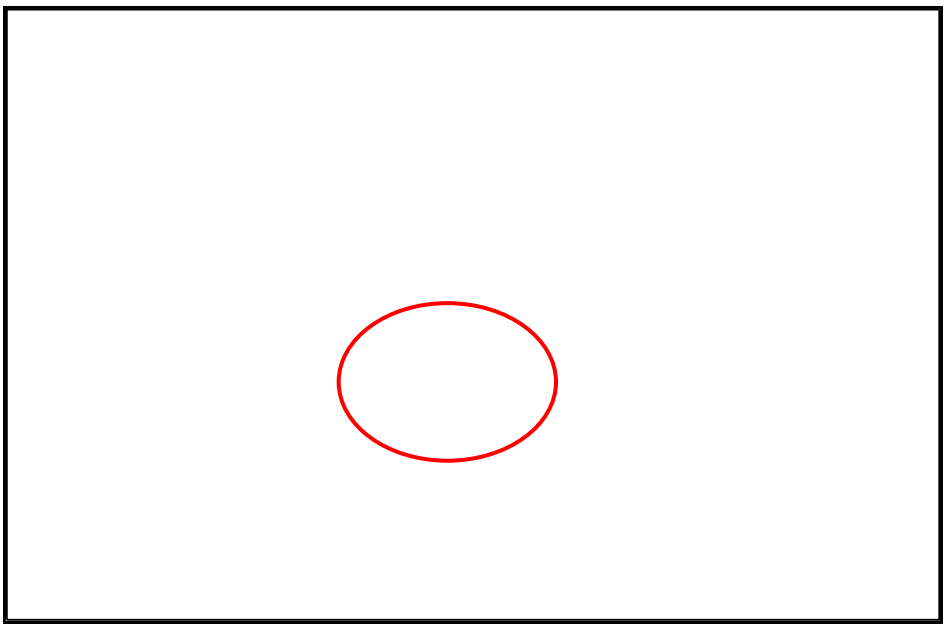


Photo 39: Mushroom exhaust valve seated correctly

5.9.7. The primary second stage regulator's mouthpiece appeared to be in good condition and on inspection, appeared to be securely attached.

5.9.8. Tests completed by Air Technology Limited, Auckland found the regulator used by Dr OSUNSADE provided the following test results:

- Cracking pressure:
  - *Primary second stage regulator 1.7 inch of water (specification – diver adjustable 0.0 to 2.5 inch – factory set)"*

- *Vacuum Test:*
  - *Primary second stage regulator – okay"*

- *Leak Test:*
  - *Primary second stage regulator – okay"*

- *Comments:*
  - *Second stages {sic. Primary second stage and Alternate second stage regulators} were tested with 200 and 50 Bar supply pressure and inhalation effort remained unchanged.*

5.9.9. During the test dive by myself in August 2014, I found Dr OSUNSADE's primary second stage regulator was hard to breath from, in comparison to my PNDS primary first stage regulators.

5.9.10. Even after adjusting the breathing resistance to the least resistance setting, I do not believe the regulator provided as good a performance as it should have.

5.9.11. After adjusting the regulator to the greatest resistance, it was noticeably harder to breathe from, more so than my PNDS regulators.

5.9.12. I believe this is due to a lack of servicing, but could most likely be attributed to the blocked sinter filter in the first stage, limiting air flow.

5.9.13. I do not believe that the primary second stage regulator itself has contributed to the death of Dr OSUNSADE, but the performance is likely to cause alarm when the Deceased was working against the effect of being well over weighted, with ill-fitting dive boots, ill-fitting / loose fins and panicked, it is likely to cause alarm, and limit the air supply to the Deceased. Refer to paragraph 5.8.24.

5.10. Alternate Second Stage Regulator

Make:	Oceanic
Model:	Alpha 9
Colour:	Yellow
Serial:	91102040
Age	29/06/2012

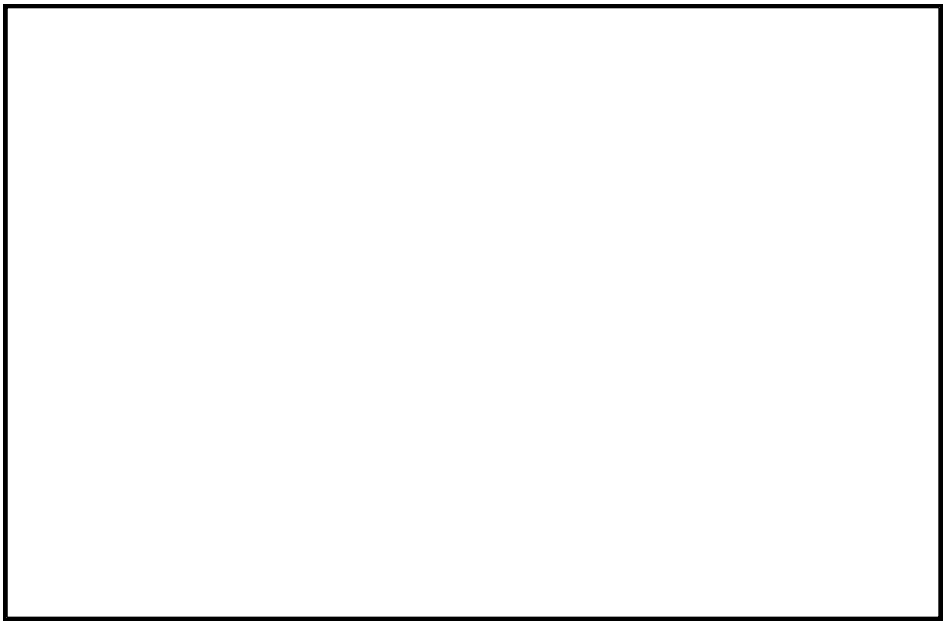


Photo 40: Alternate second stage regulator

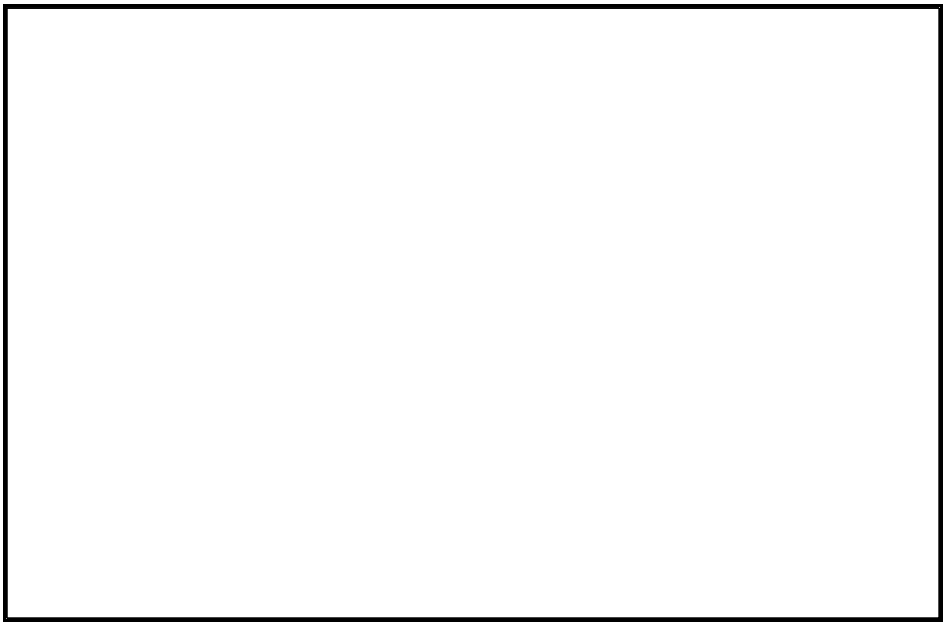


Photo 41: Alternate second stage regulator

5.10.1. The role of the alternate second stage regulator is to provide a reserve regulator, which the diver can use, should their primary second stage regulator fail during a dive.

5.10.2. The alternate second stage regulator can also be given to another diver during a dive, should the other diver run out of air in their own cylinder. This situation can be avoided by divers monitoring the contents of their own cylinder frequently during their dive.

5.10.3. Tests completed by Air Technology Limited, Auckland found the regulator used by Dr OSUNSADE provided the following test results:

- Cracking pressure:
  - *Alternate second stage regulator 1.5 inch of water(specification 1.1 to 1.4 inch)"*

- *Vacuum Test:*
  - *Alternate second stage regulator – okay"*

- *Leak Test:*
  - *Alternate second stage regulator – okay"*

- *Comments:*
  - *Second stages {sic. Primary second stage and Alternate second stage regulators} were tested with 200 and 50 Bar supply pressure and inhalation effort remained unchanged*

  - *Alternate second stage breathes harder than the factory set specification*

5.10.4. However, the mouthpiece of the alternate second stage regulator was misaligned, but this did not affect the operation of the alternate second stage regulator.

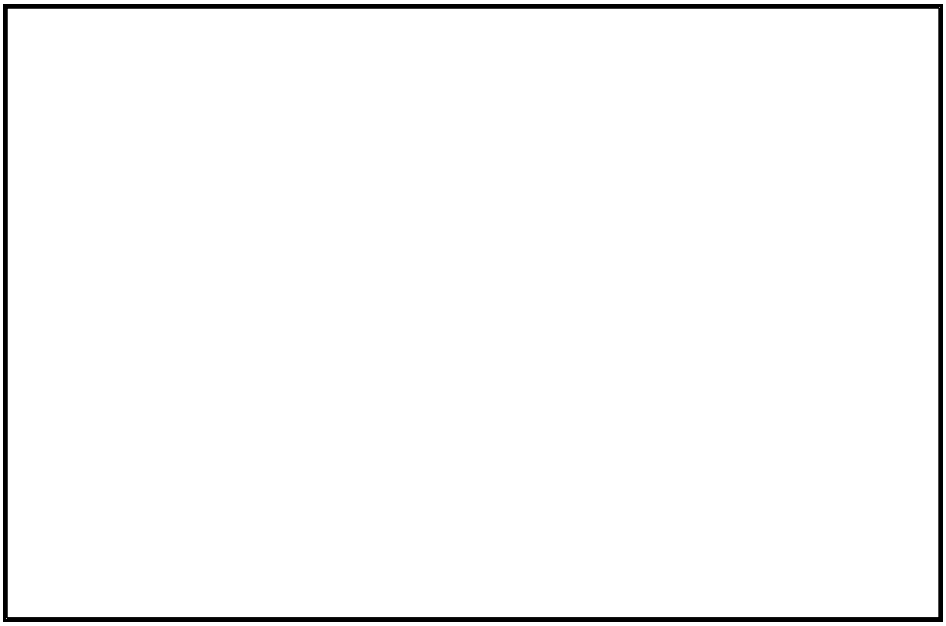


Photo 42: Mouthpiece rotated on alternate second stage regulator

5.10.5. An examination of the alternate second stage regulator body by myself in Vanuatu found the mushroom valve was seated correctly, there was no damage or debris present and it provided a vacuum seal.

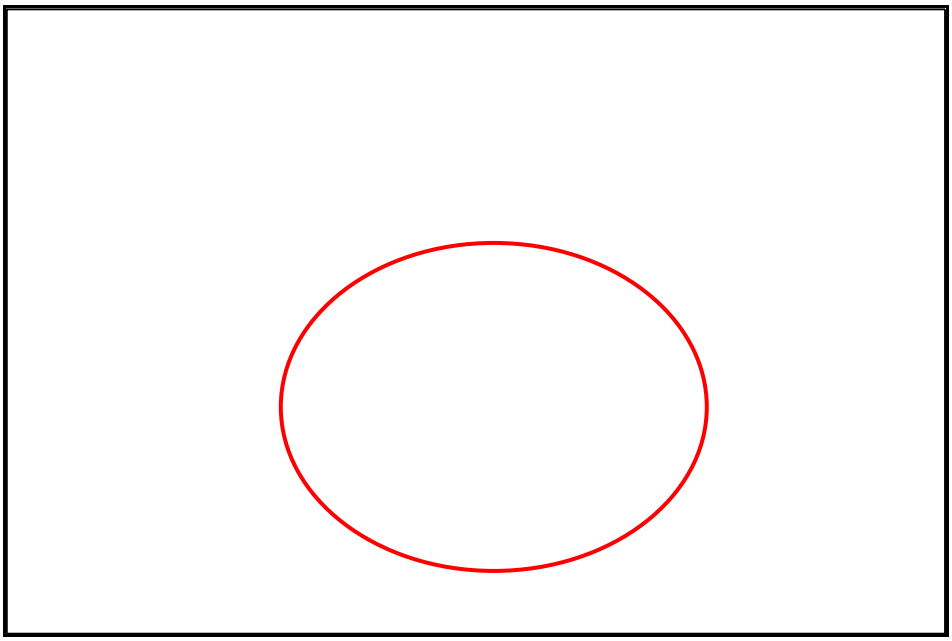


Photo 43: Mushroom exhaust valve seated correctly

5.10.6. During the test dive I completed in August 2014 with Dr OSUNSADE's dive gear, I do not believe the alternate second stage regulator provided as good a performance as it should have.

5.10.7. Whilst underwater, I switched between regulators, and noted Dr OSUNSADE's alternate second stage regulator was not as easy to breath from in comparison to my PNDS alternate second stage regulator.

5.10.8. I believe this is due to a lack of servicing, but could most likely be attributed in some part to the blocked sinter filter. The performance of the alternate second stage regulator is just outside factory specifications.

5.10.9. I do not believe that the alternate second stage regulator has contributed to the death of Dr OSUNSADE. Although the slightly high cracking effort is less than ideal. Combined with the impaired flow rate, this could cause panic or alarm in the diver at depth, and provide reduced air flow.

5.11. Rental Equipment Servicing

5.11.1. Whilst working for Mr SYED at Aquamarine, Mr BATCOCK had concerns over the state of the rental gear used by tourists, which is detailed below. This shows a timeline from when the previous owners ran Aquamarine, until Mr SYED purchased the business:

5.11.2. Mr BATCOCK states: *"I continued working for Barry and Kevin up until 2008. During this time I attended a servicing clinic run by Aquamarine. This course was a two day course, and run by Bryan McGavin, who was a Technical Diving Instructor Trainer. After this I moved back to Australia, where I completed an apprenticeship. I then got an email, asking for me to come back and start again in October 2009".*

5.11.3. *"I arrived October 2009 to find that Aquamarine had a new owner, Rehan Sayed. Sometime then I also completed an update servicing course with Phil Gray. During this time I also attended other clinic O2 servicing clinic, and compressor maintenance course".*

5.11.4. *"When I first got back, the dive manager was Bryan McGavin, he was still the dive manager from the previous owners. The other technical instructor was there as well, this was Gregory Vohoven. Not much changed in the first two months I was there. At about the end of 2009, Bryan had had enough because he was not getting what he needed to do his job. He was not able to get parts and materials to make sure everything was up to the same standard as it was before with the previous owners, so Bryan left. Both Bryan and Gregory were the servicing technicians at that time, but Bryan did most of the servicing".*

5.11.5. *"In January 2010 I left as my Visa was up. Rehan asked for me to return and work for him, which I was happy to do at that time. In April 2010 I returned to Santo to work for Rehan. There was a new instructor working for Rehan, whose name was Dane Robinson".*

5.11.6. *"I discovered that Gregory Vohoven was also leaving. Gregory was not getting paid, and again not being able to get service kits for servicing, and therefore not being able to do preventative maintenance on equipment. Maybe within a month of me returning, Gregory left".*

5.11.7. *"The state of the hire dive gear had dropped dramatically".*

5.11.8. *"I was led to believe that Dane ROBINSON was a Scubapro technician, but I never saw any certificates to back this up, and his workmanship has faults, such as parts put back in the wrong order. For example Mark 17 regulators not breathing or free flowing, because springs placed in wrong order and or left out, O-rings missing".*

5.11.9. *“He would request my assistance in servicing equipment to fix his faults”.*

5.11.10. *“Once Dane (ROBINSON) had left in late 2010, I was the only staff member left to continue servicing the hire dive equipment at Aquamarine. I would give to Rehan a complete list of everything we needed in the way of parts to fix the BCD’s, regulators, the compressors and the tank valves. I was told we cannot buy them and to just use the old bits and pieces. I explained to Rehan that if you don’t get the service kits, then you don’t use that kit for diving”*

5.11.11. *“When parts had not come, Rehan would blame it on the main, saying they have been ordered. The only real time we would get materials, wouod be when I had a customer coming over that I knew, I would get that customer to bring me service kits.*

5.11.12. *If I found faulty equipment, I would put this into the servicing room. I would be out on a dive course, only to return and find the gear for servicing not in the service room where I had left it. I spoke to Rehan and discussed that this was not acceptable”.*

5.11.13. *“From that point on, gear started falling over, to the stage where I would discover that dive guides were diving with divers on the gauntlet dive, which is 60 meters deep, well inside the wreck, no dive torches, and no dive computers or timing device at all, they would be using their guests dive watch for bottom timers. This would include: leaking HP hoses from the swivel O-Ring, free flowing second stage regulators, malfunctioning inflator unit – some would stay inflating, some would leak, some would not inflate properly, low pressure inflator hoses leaking, some cylinders out of test”.*

5.11.14. *“It got so bad that on some dives I saw some of the guides using the strobes from a dive camera to be used as a dive torch. This is bad because a strobe light is a wife diffused light, not to be used as a torch for a wreck dive. After seeing that I told Rehan that we needed to but some torches, which at first he refused to, it then got worse, where I was taking guests to ‘The Lady” in the Coolidge, which is a 30 meter penetration dive at 39 meters deep with no direct accessed to the surface, with no lights. I also saw a number of the guides well inside the wreck with no torches. When this was happening, Rehan would leave or become unavailable from comments from customers. We ended up refusing doing certain dives, due to risk, and we also faced bad feedback from tourists for not diving there. In the end we ended up diving to those locations when it was unsafe to do so”.*

5.11.15. *"If I found any dive cylinders out of test, I would put the cylinders out for servicing, and Rehan would put them back into be filled. If I found leaking neck O-ring, Valve O-ring, or burst disc's with issues, I would remove the valve and seal the tank, and then when the tanks were required, Rehan would tell Rex, who is a local guide who had experience in valves, to put them back together and we would end up with a lot of leaky tank valves".*

5.11.16. *"In total Rehan would have had 15 to 20 sets of regs, and a similar number of B.C.D's. If you check with Judy at Aquanaut…… and Rick POOLE from Professional Diving Services… they would be able to confirm the lack of service kits purchased by Aquamarine, Rick PAYNE from Scubapro will also be able to assist".*

5.11.17. An enquiry by myself with another ex-employee of Aquamarine, revealed the following concerns from Mr Ian VURO who states:

5.11.18. *"I started working for Aquamarine 2010 for only two months, before I went to New Zealand. I stayed in New Zealand for seven month. When I came back to Santo, I worked for Aquamarine again for six months. I left Aquamarine about the same time as Michael Batcock. Rehan was the owner of Aquamarine. Rehan was not paying me, the equipment was no good".*

5.11.19. *"The regulators, they free flowing, no service kit for them, we had to start using old equipment to fix the ones that were free flowing, but they still free flow. Michael was the instructor at the time, he would take the faulty regulators out of use, but Rehan was wanting us to take the regulators again and use them. He refused to pay for new service kits. He would say, they will come, they will come, use these in the meantime. A few BCD's were old from the previous owner, and were need replaced".*

5.11.20. *"Torches, we would have to dive with no torch. We had to dive with strobe lights. There were no torches, they all buggered. Rehan refused to buy new torches for us, then he bought cheap china ones from Santo, and one time, inside wreck near 'The Lady' my torch stopped. It one was on the new china torches".*

5.11.21. *"At the time, the air was good. After we left, we heard about parts being removed, but I don't know what parts".*

5.11.22. *"Rehan is a liar. When it is payday, we only get half our salary, we wait 2 - 3 weeks, before we get all of our money. We went on strike once over the issues".*

5.11.23. *"I did my SSI Nitrox Gas Blending course through Phil Gray, who has passed away. I completed my course, never got a certificate or card. The others got theirs, but I did not. When I spoke to Rehan about the certificate and card, he said we don't get a card, so I asked the instructor Phil. Phil said he had sent the certification paper to Rehan. Rehan had to pay for the certification, but he has not. The company paid for the course".*

5.11.24. *"When we had paying customers with us at a dive site, we would check the dive kit hired from Aquamarine, prior to the dive. Like sometimes we would find leaking regulators, we would give the customer our regulator. If the BCD is leaking, or stay inflating, we would change the BCD from the customer, and we would dive with it. We had to disconnect the hose so it did not keep inflating. When I spoke to Rehan about this, you just have to wait for the equipment to come, or replace it with an old one that's not leaking from the shed. This happened all the time, and the same excuses from Rehan".*

5.11.25. *"Not long after that I left".*

5.11.26. An enquiry by myself with another ex-employee of Aquamarine, revealed the following comments from Miss CHAMBERLIN who states:

5.11.27. *"When I first got to Aquamarine, the gear was in good order, but of late it is getting worse. I hear from the guides they only had a few BCD's working, but also about a year ago Rehan went back to Australia and brought new gear, which is good".*

5.11.28. *"I believe Michael Batcock used to service the gear for Aquamarine, but since he has left, I don't know who services the gear".*

5.11.29. Enquires by myself reveal the following from Mr Glenn SMEATON from Technician Services and IT Support, Scubapro UWATEC Australia in regards to Mr Dane ROBINSON's training in servicing dive gear. Mr SMEATON stated:

5.11.30. *"In a preliminary search of my records I cannot find the name Dane ROBINSON have done a course with us. My computer records go back to around 2005/06 so I cannot say he has never done a course but it certainly looks as though he has not done anything with us in the last few years. We do require technicians to do a course every two years to keep their certificate valid. If he was able to provide a time, place and through what shop that he thinks he did a course, I may be able to look a bit deeper".*

Comment:

5.11.31. I believe that if Mr ROBINSON was a qualified service technician, the lack of refresher training is a cause for concern. Given Mr BATCOCK's statement, there are concerns if Mr ROBINSON has ever completed training on the dive gear he was servicing, given the number of issues Mr BATCOCK found with his workmanship.

5.11.32. Mr Glenn SMEATON provided further comments around servicing:

5.11.33. *"We do not police the servicing schedules of dive operators so we do not know how regularly that the Aquamarine regs may have been serviced. We will not provide parts or service kits to a shop or operator that does not have a certified Scubapro technician on staff. I have no record of anyone from Aquamarine have done a course with us but they may have done one with a different store before coming to Aquamarine or done a course with a different Scubapro office somewhere in the world".*

5.11.34. Mr Glenn SMEATON was asked to provide feedback around service kits ordered. He provided the following comments:

5.11.35. *"I have looked at Aquamarines purchases from now back to the beginning of 2010 and in that time we have not sold them any regulators or BCD's out of this office. They have purchased service kits on two occasions in that time".*

5.11.36. *"01/06/2010: 3 x Mk2+ first stage service kits and 3 x Mk11 first stage service kits".*

5.11.37. *"14/01/2011: 1 x Mk25 first stage service kit and 5 x R-series second stage service kits".*

5.11.38. This matches Mr BATCOCK's statement where he stated *"In total Rehan would have had 15 to 20 sets of regs, and a similar number of B.C.D's. If you check with Judy at Aquanaut…… and Rick POOLE from Professional Diving Services… they would be able to confirm the lack of service kits purchased by Aquamarine, Rick PAYNE from Scubapro will also be able to assist".*

Comment:

5.11.39. In effect, although Aquamarine are not authorised service agents to service their own rental diver gear, staff working for Aquamarine, or tourists on a working holiday, who have attended the appropriate service clinics are authorised to service the rental gear in which they are trained, but this does not certify them to service all dive gear.

However, Mr SYED has not provided me with proof of servicing by means of a log book, and this raises safety concerns.

I believe for the size of Aquamarine and the number of sets of rental dive gear they have, the number of service kits being ordered is inadequate. To me, this indicates that the majority of the equipment has not been serviced.

5.11.40. Enquires by PNDS reveal the following from Mr John RIGBY, General Manager Aquanaut Pty in regards to service kits ordered by Aquamarine. Mr RIGBY states:

5.11.41. *"The last time we sold any product to Aquamarine in Santo Vanuatu was in September 2011. The last time any scuba hardware items were supplied to Aquamarine Santo direct from Aquanaut was in June 2010 – this was 1 x Suunto Zoop wrist computer. This is in fact the only hardware item other than another dive computer we have showing on their account history".*

5.11.42. *"The last time we sold any spare parts to Aquamarine Santo was in July 2010 – this was for 10x Service Kit for Aqualung Conshelf & Titan 1st stage. At the same time they purchased 1 x 2OZ syringe of Christo Lube MCG 111 lubricant".*

5.11.43. *"Please note that we ceased distribution of Aqua Lung products on 1st Jan 2013"*

Comment:

5.11.44. In July 2010, Aquamarine have serviced most of their dive regulators. However this is the only time they have serviced the regulator sets according to records provided by Mr RIGBY. This is not an acceptable practice, and contradicts manufacturer's recommendations for servicing.

5.11.45. *"Because of complicated import / customs rules and taxes it is quite common for operators in many of the pacific islands to ask travelling groups of divers or individuals to carry in equipment and spare parts for them. This may simply be spare parts or actual hardware equipment. For this reason it is impossible for us to know what other equipment they may have purchased that may have originated from Aquanaut".*

5.11.46. *"Regarding the service interval question – this would depend on the brand of equipment in use and would be subject to the manufacturer's recommendation. Generally this is 12 monthly although all manufacturers generally state "or more frequently in high use environments".*

5.11.47. *"Regarding any concerns over Aquamarine servicing equipment; our records state that someone from Aquamarine attended an advanced service training seminar conducted by Aquanaut in September 2011. As we have no history of hardware sales there would be no cause for any concerns regarding servicing from our side. Note that these operators generally have a transient workforce and it is not uncommon for members of their workforce to have service qualifications. Such workers may come from AU, NZ, UK, US or any other country where they may have already received service training. Maybe the best approach in this instance is to ask who conducted servicing and what qualification they have. The industry standard is generally that the person has received manufacturer endorsed training on the equipment being serviced".*

5.11.48. *"One of my colleagues who was more involved in the sales for Vanuatu. He has told me that Rehan had contacted him not long after taking on the Aquamarine business regarding equipment purchases however this never came to fruition whilst we were the distributor of Aqua Lung. My colleague believes that at the time he opted for some second hand equipment that was brought in from another operation – some of which was Scubapro and some which was Aqua Lung".*

5.11.49. PNDS made further enquiries with the companies Aquamarine have purchased dive gear from since Mr SYED purchased Aquamarine. The following is a summary from 2010 until the fatal dive, where the Deceased was using Aquamarine's most recent dive gear.

5.11.50. According to Mr SYED, in 2010 he purchased new dive gear from Scubapro. Mr SYED told me the following:

5.11.51. *"Scubapro has a policy of no service required for one year, provided you don't flood the regulator and you look after it, i.e. rinse it".*

5.11.52. *"My biggest part turnover is HP hoses. They develop small micro holes".*

Comment:

5.11.53. I believe this is due to Mr SYED over filling the dive cylinders

5.11.54. *"After the first year, I got two Scubapro technicians who were customers of ours to service the gear. This service would last one year".*

5.11.55. *"I cannot remember who I ordered the service kits from Scubapro from".*

5.11.56. However police enquires made with Mr RIGBY from Aquanaut Pty, Australia do not validate Mr SYED's comments. Scubapro is distributed by Aquanaut. Mr RIGBY told New Zealand Police:

5.11.57. *"The last time we sold any spare parts to Aquamarine Santo was in July 2010 – this was for 10x Service Kit for Aqualung Conshelf & Titan 1st stage. At the same time they purchased 1 x 2OZ syringe of Christo Lube MCG 111 lubricant".*

5.11.58. Aquanaut Pty, Australia stopped supplying service kits on 1 January 2013. By this time, Mr SYED had changed Aquamarines hire dive equipment to another brand.

5.11.59. During the investigation in Vanuatu, I requested to view the service log books for the rental Aqualung dive gear. Mr SYED's reply was:

5.11.60. *"We did have registers for the hire gear we used to service, however we have had a clean out, so I don't know if I still have these".*

5.11.61. Mr SYED was asked who used to service the Aqualung dive gear. In response Mr SYED stated:

5.11.62. *"I ran a deal for these customers in that I would pay half their airfare, they would stay and dive for free, and in return, I would pay for service kits and they provided a free service"*.

5.11.63. Without evidence supporting Mr SYED's statement, I have concerns over the potential lack of servicing being completed.

5.11.64. This lack of servicing is supported by Mr BATCOCK's statement, and casts doubts on the accuracy of Mr SYED's statement.

5.11.65. According to Mr SYED, in 2013 he purchased new dive gear from Oceanic. Mr SYED went on to state the following:

5.11.66. *"We used that gear for two years, and in the first week of March 2013, we dumped everything, it was looking run down, so we got brand new Oceanic gear. Oceanic B.C.D, Oceanic Regulators. By 15 March 2013, we had all new gear again".*

5.11.67. *"I have ordered Oceanic service kits for my regulators".*

5.11.68. *"Even if my gear is not being used, the regulators still get serviced. But in terms of the B.C.D itself, we change O-rings in the inflator / deflator".*

5.11.69. *"There are only three O-rings in the model that we have that you can change. The model of Oceanic B.C.D are GBR".*

5.11.70. *"This gear will be due for service, and we have a new instructor. His name is Adam Braydon. He is going to be put through the servicing workshop for this gear. This workshop is based in Melbourne".*

5.11.71. *"Adam is going to do the workshop for Oceanic CDX regulators, and he is already a service technician for a different brand".*

5.11.72. It is important to note that Mr SYED has misquoted the date he purchased the Oceanic dive gear from Australian Underwater Products which he stated was in March 2013. Supporting evidence of this can be found from Mr CHAPMAN who works for Australian Underwater Products. Mr CHAPMAN provided PNDS with dispatch dates of the dive regulators the Deceased was using. But this date given was 29 June 2012, which relates to when the dive regulators were dispatched from the warehouse.

5.11.73. Enquires by PNDS reveal the following from AUP, Australian Underwater Products, when asked to comment on servicing of dive regulators used by the Deceased. Mr CHAPMAN provided the following comments:

- *"Regulator CDX5 – Dispatched from our warehouse on 29/06/2012 to Aqua Marine Vanuatu. S/N 01225433 Invoice Number 177162. No Registration or Service History recorded".*

- *"Regulator GT3 - Dispatched from our warehouse on 29/06/2012 to Aqua Marine Vanuatu. S/N 00446691 Invoice Number 177162. No Registration or Service History recorded".*

- *"Regulator Alpha 9 Octo - Dispatched from our warehouse on 29/06/2012 to Aqua Marine Vanuatu. S/N 91102040 Invoice Number 177162. No Registration or Service History recorded".*

- *"<u>GUIDELINE FOR REGULATOR EQUIPMENT MINIMUM SERVICE INTERVALS</u>:"*
  "This is an extraction from the Administration Document 12-2201-r03 on General Information about Oceanic Regulators and servicing intervals".

- *"NOTE: Due to variations of use and storage time that Oceanic Regulator equipment may be subjected to, the Guidelines and defined Intervals given herein are subject to the discretion of the owner of the specific product. Inspection and/or service indicated must be performed only by an Authorized Oceanic Dealer".*

“Personally owned equipment used for recreational diving activity”:
“Equipment used 100 dives or less per year should be serviced at least once per year”.

- *“Equipment used more than 100 dives per year should be serviced after 100 dives prior to further use”.*
- *“Equipment stored for more than 6 months should be inspected, and serviced as required, prior to use”.*
- *“Equipment used for dive training and/or consumer rental activities:”*
- *“Equipment should be inspected prior to every use”.*
- *“Equipment should be serviced at least once every 6 months regardless of use”.*
- *“Equipment should be serviced after 100 dives, prior to further use”.*
- *“Equipment stored for more than 3 months should be inspected, and serviced as required, prior to use”.*
- *“Regardless of ownership or intended use:”*
  “Equipment should be inspected and serviced if it displays any sign of leakage or malfunction”.
- *“Equipment should be inspected and serviced if the first stage inlet filter shows any sign of residue or discoloration”.*
- *“Equipment should be inspected and serviced if it displays signs of improper performance or breathing effort”.*
- *“Equipment should be inspected and serviced as required if it displays signs of free flowing”.*
- “Equipment should be inspected and serviced if o-rings or hoses display any signs of deterioration”.

Comment:

5.11.74. Regardless of the lack of local guidelines in Vanuatu, the manufacturer’s specifications for servicing should be followed as a minimum. In this case:

- Inspected prior to every dive
- Serviced at least every six months, or
- Serviced after 100 dives

5.11.75. Based off Mr CHAPMAN's information relating to servicing schedules, I believe there is a pattern emerging relating to the lack of maintenance for the rental dive gear that Aquamarine had for tourists.

5.11.76. I am unable to confirm if Aquamarine has regularly serviced their rental dive gear, as Mr SYED failed to provide copies of servicing records to me.

5.11.77. I am unable to confirm if the staff that Mr SYED used to service the rental gear had the necessary skills and/or qualifications to conduct the servicing.

5.11.78. I am able to confirm that the supplier of the regulator has not supplied Aquamarine any service kits. Also the supplier themselves records and registers the regulators, which has not been done by Aquamarine, and subsequently no service records exist with Australian Underwater Products for those regulators.

Comment:

5.11.79. To use someone who is not qualified, or has not completed regular update servicing clinics, is extremely risky and could put diver's lives at risk, given the nature of the diving being conducted.

When PNDS removed the yoke assembly from the first stage regulator, an additional O-Ring was located jammed between the sinter filter and the yoke body next to the spring.

This O-Ring would not have been installed from the factory like this, and corroborates Mr BATCOCK's statement, when he noted parts being installed in the wrong order back in 2010 when he started working for Aquamarine again.

This indicates the first stage regulator yoke assembly has been disassembled since its purchase in 2012, and given Mr SYED's statement, it is assumed someone who is not known to be qualified to service the Oceanic CDX5, has stripped it at some stage.

I am unable to support the statement by Mr SYED that the regulators were serviced by an approved technician, as Mr SYED was unable to produce service records, and this raises concerns whether service records exist, or servicing took place.

This is placing divers at risk, with potentially unqualified staff servicing dive gear.

5.11.80. During my investigation in Vanuatu, Mr SYED was telephoned on Saturday 8 March 2014 after being unable to be located at the Aquamarine premises. During that phone call, Mr SYED was again asked about the training records and servicing records. In response Mr SYED advised he would call me back, as he was in a meeting. This call never eventuated.

5.11.81. Later that same day, Mr SYED refused to allow me access to staff due to customers being present, and that he was busy dealing with a cruise liner coming in with a lot of customers. Further communications with Mr SYED went unanswered that day.

5.11.82. I visited Aquamarine's dive site later that day, which is located at the shoreline where the wreck of the SS President Coolidge is located.

5.11.83. Whilst there, I waited for the four customers to enter the water, prior to speaking with one staff member from Aquamarine.

5.11.84. During this time, the remaining dive equipment brought along for the next dive was checked by me on Saturday 8 March 2014, and a spare set of Oceanic stage bottle regulators were located and tested.

5.11.85. The primary second stage regulator had a slow free flow, as did another set of spare regulators used for a decompression dive cylinder/slung cylinder carried by the dive guide. I also noted that the spare set of regulators which could be used by tourists for diving, had a SPG with a maximum depth of just 45 metres.

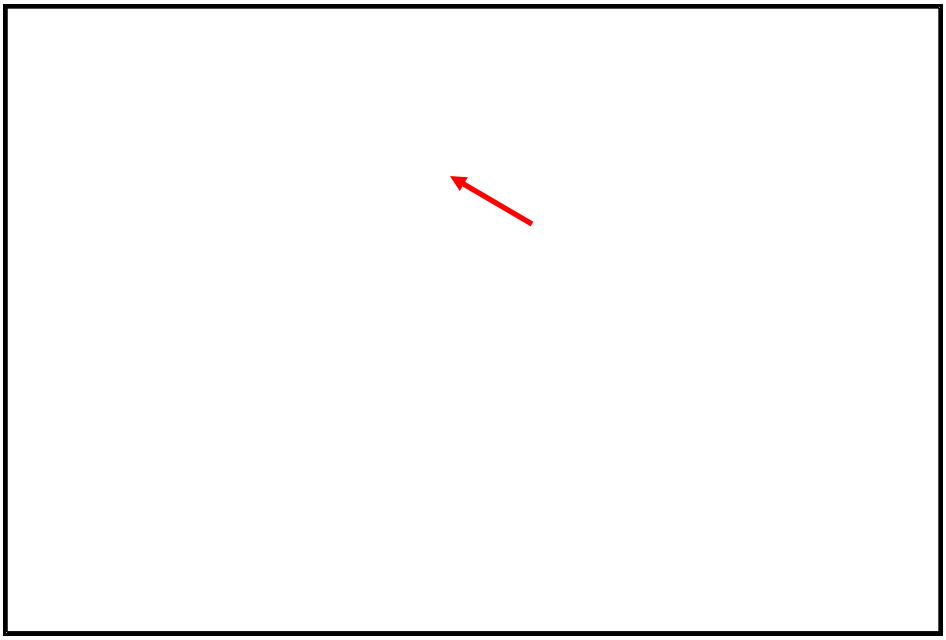


Photo 44: SPG showing 240 Bar cylinder contents

Comment:

5.11.86. Normally a SPG with a maximum depth of 45 metres would not be an issue for a recreational diver. However, a 45 metre dive is reasonably shallow on the SS President Coolidge. With dives to the stern, a diver can reach a depth of 65 metres.

The risk is that at any depth greater than 45 metres, the dive guide would have no idea what depth a paying customer actually dived to. This raises serious issues around safety, and appears to be an acceptable practice for Aquamarine to be allowing customers to get into.

This is a significant risk and Aquamarine must have rental dive equipment that will exceed the depths to which they are guiding customers to, it needs to be fit for purpose.

5.11.87. However these faults detailed above were not found in the regulators used by the Deceased.

5.11.88. I believe there is an apparent lack of servicing and a lack of appropriate equipment.

5.11.89. Should Mr SYED find these servicing logbooks, ideally he would need to show the serial numbers of each piece of kit serviced, including dates when serviced, what staff member or customer serviced these, and provide a valid means for me to be able to contact that person(s) to corroborate the service logbook entries.

5.11.90. During the course of the investigation, PNDS contacted various training agencies and the following revelations were passed on from the Director of SDI TDI ERDI Australia, Mr Troy STEPHENSON, who had received an email from Mr Tom ELLIS. Mr ELLIS had dived with Aquamarine in 2011 and provided third hand information to Mr STEPHENSON.

5.11.91. Enquiries have established that Mr ELLIS is a certified Divemaster, CDAA Deep Cavern Diver, and a SDI Nitrox Diver. Mr ELLIS's stated:

5.11.92. *"Two of our group without there own gear looked at the gear from Aquamarine and did not dive with them again, sticky infiltrator hoses, leaky regs fizzing sounds, broken SPG's, very very shoddy and more to the point dangerous".*

5.11.93. *"I was using a stage bottle as backup and was given a reg set up with no SPG after asking for an SPG I was given one which, upon testing did not register any pressure at all. The hoses and regs were all leaky or had pin holes in them".*

5.11.94. *"Each of the regs had a 'tested 08/11" on them".*

5.11.95. *"On a deco stop I watched an instructor turn on a hang tank when the firstastage blew at both the O-Ring (DIN Valve) and inside the first stage resulting in a free flow from the first stage and tank".*

5.11.96. *"I spoke to the instructor after the event and he mentioned he had concerns about safety and has since left the organization, he stated this was a result of his safety concerns not being heard".*

5.11.97. *"I acknowledge that this may have been a one off bad experience but my training and experience with different dive operators around the world indicate that this was more than a one off issue".*

5.11.98. The next training agency I contacted was SSI. The General Manager of SSI Australia, Mr Mark McCRUM provided a SSI Dive Instructors name; Mr Martin WILLIAMS, for myself to make enquiries with, as Mr WILLIAMS had worked for Aquamarine in 2011.

5.11.99. I contacted Mr WILLIAMS, who made the following comments:

5.11.100. *"The owner was Rehan. I worked there for a month I was there in September 2011. Rehan was to organise all work permits and Immigration papers. I know he had not as I was finned when I left the country I did not know this until I applied for a job with Mal Davies at Santo Island Dive".*

5.11.101. *"I was a specialty Instructor for SSI".*

5.11.102. *"I taught approx. 15 open water courses mainly for the Doctors visiting and working in the hospital. I also taught the 4 locals working for Aquamarine some specialties. I know that it took several attempts to get the workers there certifications and also some of the Doctors. They contacted me and also through Facebook to the Aquamarine page. I am unable to find the emails as I have changed computers and the web mail has deleted them as a long time has passed".*

5.11.103. *"I had attended 2 service clinics before I went out to Vanuatu".*

5.11.104. *"I did have to complete some servicing as they did not have enough working equipment to take a class of 4 for open water course. I had to service some Maree BCD's and also Tank valves. They were leaking. Some of the tanks had corrosion inside them and they were getting rolled around the floor with glass balls in them and then cleaned out. This improved the tanks. The valves had to be stripped, cleaned from corrosion and then re assembled".*

5.11.105. *"When I arrived there had been 2 other service technicians servicing all of the equipment but most of the gear was still in pieces layed over the table. Only 2 torches worked. The regs, BCD's, wet suits, masks and dive cylinders were in very poor condition. Rehan said he was going to purchase some new equipment after one of my students went through 3 BCD's in the space of 5 minutes. I found the new equipment for Rehan and we did purchase it but he wanted the dive gear to be sent to Australia so a dive group could bring it out so he did not have to pay the duty or tax in Vanuatu. I organised this and then my contract ran out and I left before the new gear came".*

5.11.106. Mr WILLIAMS was asked to comment on the air compressors at Aquamarine, his response was: *"One was broken and waiting for parts to come from Australia. The other was working but air was moist. Rehan blended his own Oxygen for nitrox diving and did not have the correct gauges to do this. I can remember taking a group out for 2 dives and the tour leader had testing equipment to test the Nitrox mixture and at least half of the tanks had too much oxygen in them for the dive and skill level for the group".*

5.11.107. Mr WILLIAMS was asked to comment on Aquamarines business in general, his response was: "*I felt that the business was very run down. When I stayed at the shop I could see that there was lots of room for improvement but money would need to be spent on it. The staff morale was very low. All the local workers wanted me to stay as the instructor and help change the company around".*

5.11.108. Mr WILLIAMS was asked to comment on safety concerns at Aquamarine, his response was: "*Yes I had safety concerns as I have explained with the episode of the BCD I had with one of my students. Some times when I took my students for a dive near the Coolidge we noticed the spare cylinder at the deco stop was leaking and turned it off to save the air left inside".*

5.11.109. *"I did not fill any cylinders but did notice they did not fill them in a bath of water to cool the tanks. The compressors were old, one not working, one over worked. In the month I was there the filters never got changed".*

5.11.110. Mr WILLIAMS was asked to comment on air quality concerns at Aquamarine, his response was: "*Yes I did encounter foul air and received complaints. I got a sore throat/infection from the air in the tanks as I was using them every day. Once they had been clean with the glass balls and bleach they improved".*

Comment:

5.11.111. Bleach is not a recommended cleaning product for cleaning the interior of a dive cylinder. Recommended cleaning product is very hot water or as per the manufacturers recommendations.

5.11.112. Mr WILLIAMS was asked to comment on stage/deco dive cylinders with faults/issues, his response was: "*Yes there were reports and I had seen leaking tanks for the stage/deco cylinders. The regulators also leaked at times".*

5.11.113. I believe the above information suggests a lack of regular servicing. Given the nature of the depths involved, and wreck penetrations, the dive gear should be in excellent working order, and detailed records kept of the work done, parts fitted and who completed the service.

5.12. Depth Gauge

Make:	Oceanic
Model:	SWIV
Units:	Metres/analogue

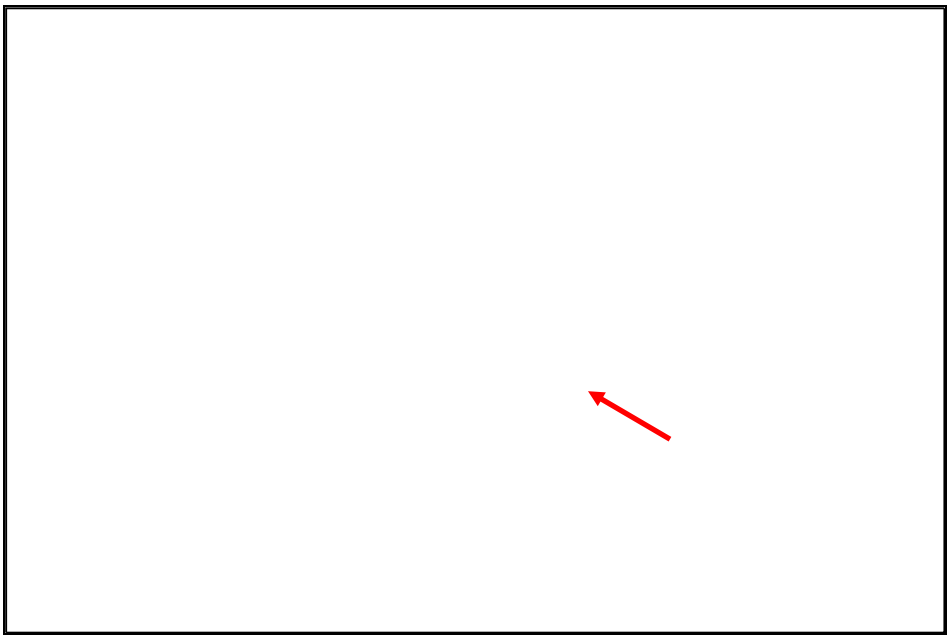


Photo 45: Depth Gauge

Note: arrow shows position of needle at approximately 40 metres depth

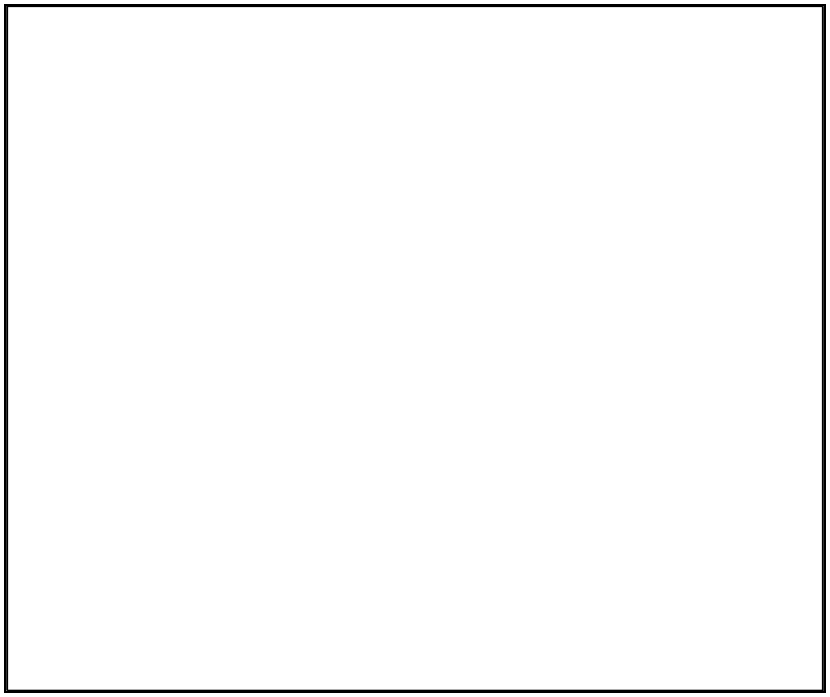
5.12.1. The role of a depth gauge is to provide the diver with information on the current depth and maximum depth attained during a dive.

5.12.2. This is critical to ensure the diver is aware of the depth and, along with time, can manage any decompression or safety stops that are required.

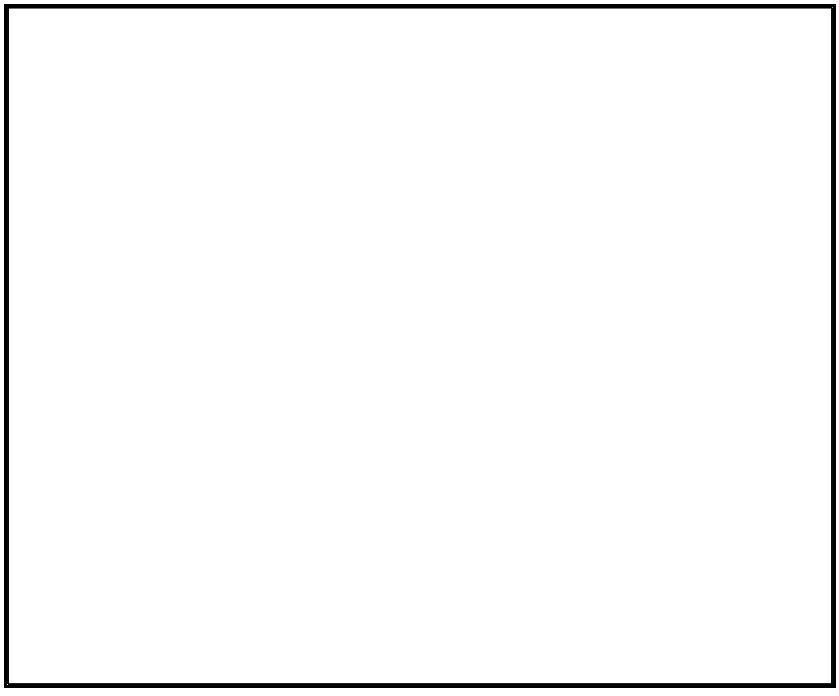
5.12.3. The depth gauge was in good condition and the needle position was photographed and marked when the equipment was seized.

5.12.4. In this case the depth of the fatal dive was recorded at 40 metres. The Deceased was located by Mr JEREMIAH at 41 metres.

5.12.5. When tested against a calibrated depth gauge, Dr OSUNSADE's gauge gave an accurate reading.



Yellow line is best practice



Yellow line is best practice

5.12.6. I therefore do not believe the depth gauge was a contributing factor in this death.

5.13. Submersible Pressure Gauge - SPG

Make: Oceanic
Readings: Metric

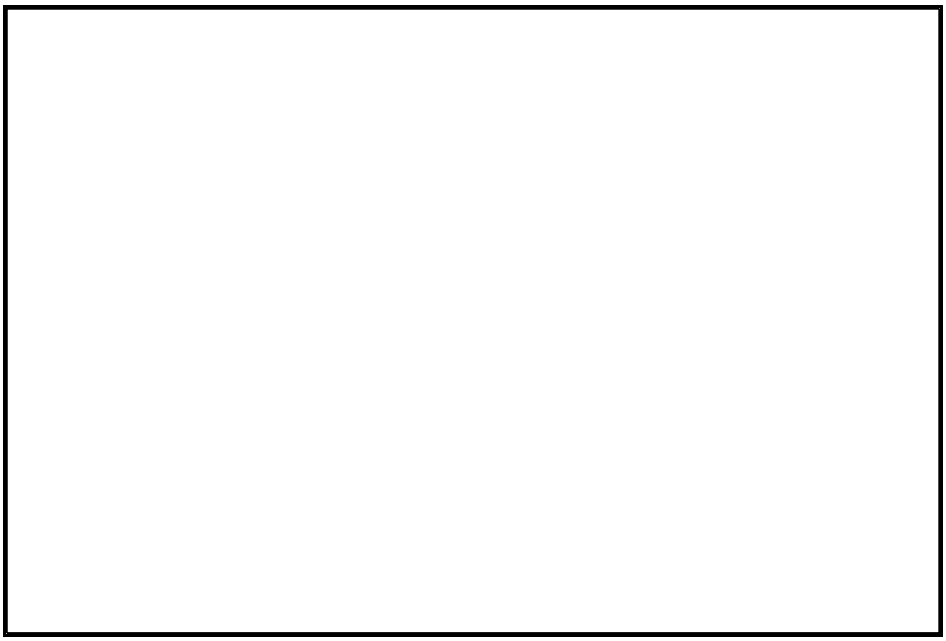


Photo 46: Submersible pressure gauge (SPG)

5.13.1. The role of the submersible pressure gauge (SPG) is to provide the diver with information on the contents of their air cylinder to avoid running out of air during a dive.

5.13.2. The SPG measures the high pressure contents of the cylinder, which is fed through a high pressure hose from the first stage regulator.

5.13.3. The SPG was tested by the Police National Dive Squad using calibrated gauges and was found to be accurate at 100 and 150 Bar. At 50 and 200 Bar on Dr OSUNSADE's SPG, the calibrated gauge read 1 Bar lower.

5.13.4. This is an acceptable result.

5.13.5. I do not believe the SPG contributed to the death of Dr OSUNSADE.

5.14. Hoses

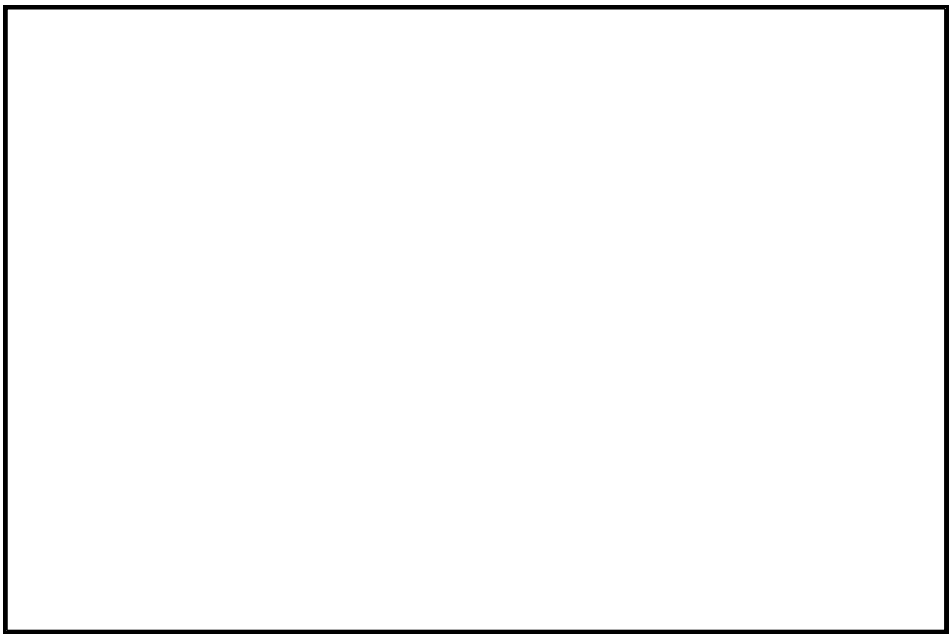


Photo 47: Hoses

5.14.1. The hoses feed air from the first stage regulator to the diver and the SPG (submersible pressure gauge).

5.14.2. Enquiries with Vanuatu Police reveal after the dive gear was seized, it was left to dry in the exhibits store, and was not washed with fresh water to remove the salt water deposits.

5.14.3. This, over time, has left the exterior of the dive regulators in an average condition, with deposit build up that is not believed to have been present at the time of the death of Dr OSUNSADE.

5.14.4. A minor leak was detected at the low pressure inflator hose during testing, but no other leaks were detected. The usual scrapes and marks were evident as expected for normal wear and tear of hire gear.

5.14.5. I do not believe any of the hoses to be a contributing factor to the death of Dr OSUNSADE.

5.15. Dive Computer

Make:	Suunto
Model:	D9
Colour:	Black
Readings:	Metric / Digital
Serial	14602120

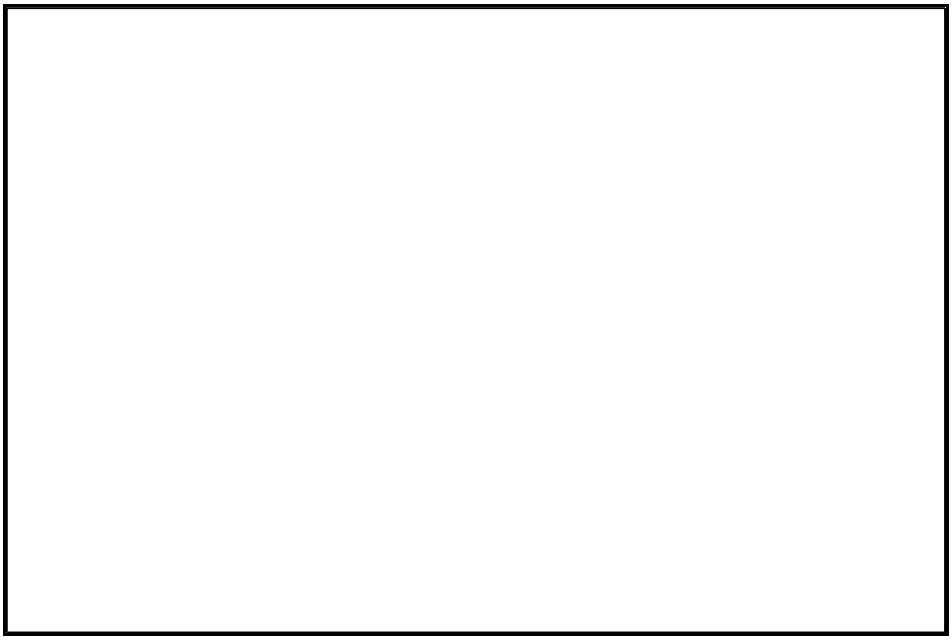


Photo 48: Dive Computer

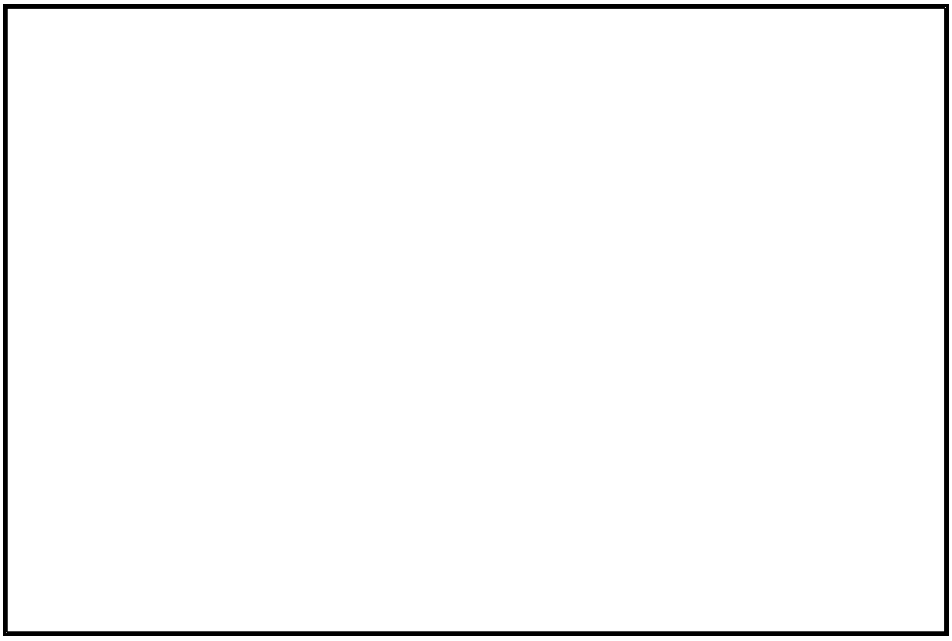


Photo 49: Dive Computer - Rear

5.15.1. The role of the dive computer is to provide the diver with a raft of information whilst in water, such as:

- Current depth
- Cylinder pressure
- Air time remaining
- Ascent rate
- No decompression time remaining
- Decompression stops required
- Temperature

5.15.2. Police enquiries show the computer was owned by the Deceased.

5.15.3. The computer is in excellent condition and the dive logs/data were able to be downloaded by PNDS in May 2014.

5.15.4. A total of 12 dives logged on the D9 dive watch were able to be downloaded.

5.15.5. This model of D9 Suunto dive watch, allows for a wireless cylinder pressure transmitter module to be attached to the first stage regulator. When fitted, it allows the diver to view cylinder contents and breathing rate.

5.15.6. In this case, the Deceased did not have the wireless transmitter module fitted.

5.15.7. When inspecting the Deceased's dive log from her D9 Suunto dive watch, the log indicates that several ascent warning alarms have sounded on her dives

5.15.8. It is important to note that these ascent warning alarms are easy to activate, as most Suunto dive watches have a conservative ascent rate. Sunnto's dive computers warn divers when the divers' ascent rate exceeds 10 metres/minute.

5.15.9. The recommended maximum ascent rate widely used is 18 metres per minute.

5.15.10. It is easy to exceed such a conservative ascent rate, as any sudden rise, will trigger a warning. Depth alarms are set by the diver to ensure they do not exceed a depth, fast ascent warnings are where a diver exceeds an ascent rate of 10 metres per minute, Examples of when the Deceased has breached her ascent rate can be seen below:

- 29/4/13 - depth alarm and fast ascent warning (x 2)
- 30/4/13 - depth alarm and fast ascent warning (x 2)
- 30/4/13 - depth alarm
- 1/5/13 - depth alarm, mandatory ceiling error (possibly safety stop as alarm sounded at 5min into dive immediately prior to surfacing), fast ascent warning (x 4)
- 1/5/13 - depth alarm (x 3), fast ascent warning (x 4)
- 2/5/13 - depth alarm (30m), fast ascent warning at 12min, below floor deco alert at 14min (Deceased about to go into a decompression dive), fast ascent warning (x 3) from 50min, ceiling broken alert at 59min (the Deceased being recovered directly to the surface without completing decompression stops).

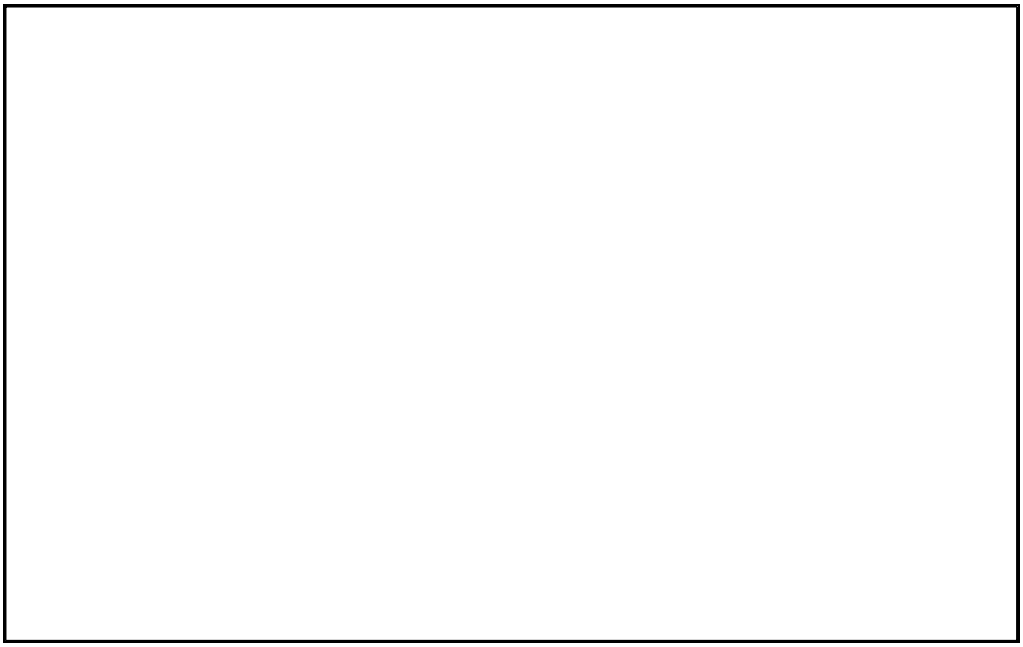
5.15.11. I do not believe the ascent rate during any part of the fatal dive contributed to the death of Dr OSUNSADE.

5.15.12. On some of the Deceased's dives, there are also ceiling alarms which have sounded. Again, these are easily explained looking at some of the Deceased's dive profiles, as she has resurfaced within minutes of starting the dive, thereby breaching the ceiling on her dive watch, which has promulgated an alarm in the dive log history.

5.15.13. A test dive conducted by me in August 2014 confirmed the Deceased's dive computer was working correctly.

5.15.14. This is backed up through testing conducted by me, whereby the Deceased's dive watch was tested in a calibrated water pressure chamber, looking at the accuracy of the Deceased's watch during descent.

5.15.15. When tested to a depth of 50 metres in a calibrated water pressure chamber, the dive computer provided accurate readings as shown below.



Comment: Self-Test and Battery Condition

5.15.16. Good dive practice is to manually activate the dive computer when on the surface to ensure there are no faults with the dive computer and there is sufficient battery power.

5.15.17. When test dived by me in August 2014, the battery was found to be working correctly.

5.15.18. I do not believe the Suunto D9 dive computer to be a contributing factor to the death of Dr OSUNSADE, but it does detail the events including the days prior to her death.

5.16. Diving History and Dive Computer Downloads

5.16.1. Dr OSUNSADE had logged only 37 dives prior to her first dive with Aquamarine in April 2013.

5.16.2. A check of her dive log book and enquiries on her diving experience would have shown she had not completed many recreational dives outside of her PADI dive courses.

Comment:

5.16.3. A close examination, and/or questioning of Dr OSUNSADE by Aquamarine, would have shown she has completed a number of courses, and potentially has not completed many recreational dives, unless these were not logged.

5.16.4. The dive on Monday 29 April 2013 was to the Promenade Deck on the SS President Coolidge, which requires two decompression stops; one at six metres for six minutes, the last stop at three metres for ten minutes.

5.16.5. A decompression dive requires the diver to complete a stop, or a number of stops at set depths prior to surface. The number and duration of the decompression stops depend on the diver's bottom time and depth.

5.16.6. Unlike recreational diving, decompression diving means a diver cannot ascend to the surface at any time throughout the dive without risk of developing decompression sickness i.e. the bends.

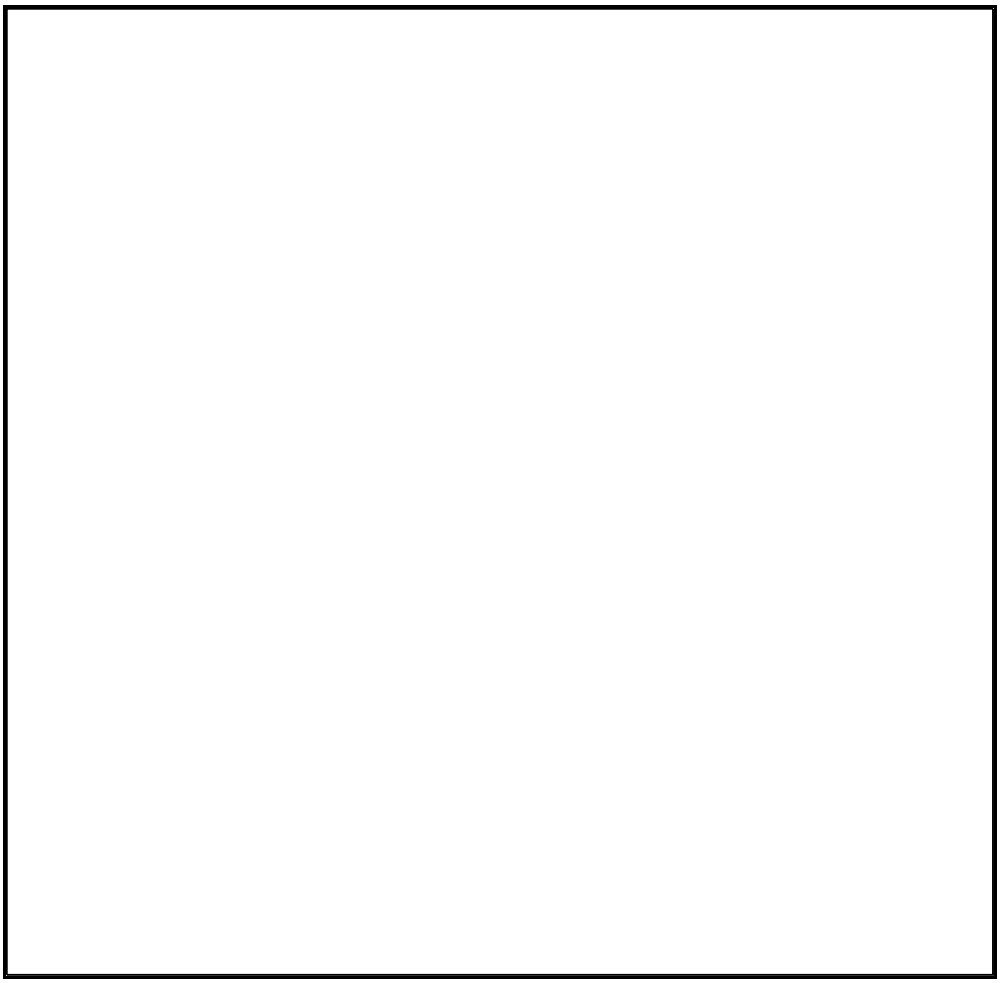


Figure 4: Dive Computer summary 29/04/2013

5.16.7. This dive has been verified as having been completed by Dr OSUNSADE, as it has been logged by her into her Dive Log Book.

5.16.8. It is important to note a discrepancy in timings as shown on Dr OSUNSADE's dive computer. Dr OSUNSADE's dive computer does not appear to be set to New Zealand time or to Vanuatu time.

5.16.9. Vanuatu is one hour behind New Zealand time.

5.16.10. The following is a summary of the date and time, according to Dr OSUNSADE's dive watch that she started each dive in Vanuatu:

Date	Dive Watch Time
29.04.13	11:00 am
30.04.13	7:05 am
30.04.13	9:02 am
01.05.13	7:21 am
01.05.13	12:27 pm
02.05.13	10:28 am

5.16.11. I believe Dr OSUNSADE's dive watch time is still set for local time in Bali, Indonesia, where she did her last dive trip between 13 and 15 August 2012.

5.16.12. Bali is four hours behind New Zealand in August when Dr OSUNSADE dived in Bali.

5.16.13. Therefore the dive times recorded between Monday 29 April and Wednesday 1 May 2013 in Vanuatu are actually three hours after what is shown on the watch.

5.16.14. When I went to Vanuatu in March 2014, I observed Aquamarine completing two dives on Saturday 8 March 2014. I noted the following times divers started their dives:

Date	Dive Start (Vanuatu) Time	New Zealand Time
08.03.2014	10:05 am	11:05 am
08.03.2014	11:15 am	12:15 pm

5.16.15. In addition, it appears Dr OSUNSADE has altered the time on her dive watch during her stay in Vanuatu near the end of her trip. Dr OSUNSADE's dive watch is a dive computer and watch encompassed as one unit.

5.16.16. Based on my findings, I believe Dr OSUNSADE did not use her dive watch for day to day use, but instead just as a dive computer.

5.16.17. The change in the time on Dr OSUNSADE's dive watch has occurred after her second dive on Wednesday 1 May 2013, or prior to the fatal dive on Thursday 2 May 2013.

5.16.18. I believe Dr OSUNSADE has set her dive watch time to Vanuatu time.

5.16.19. On the morning of Tuesday 30 April 2013 at about 8:30am, Dr OSUNSADE was picked up by Aquamarine and completed another dive on the SS President Coolidge.

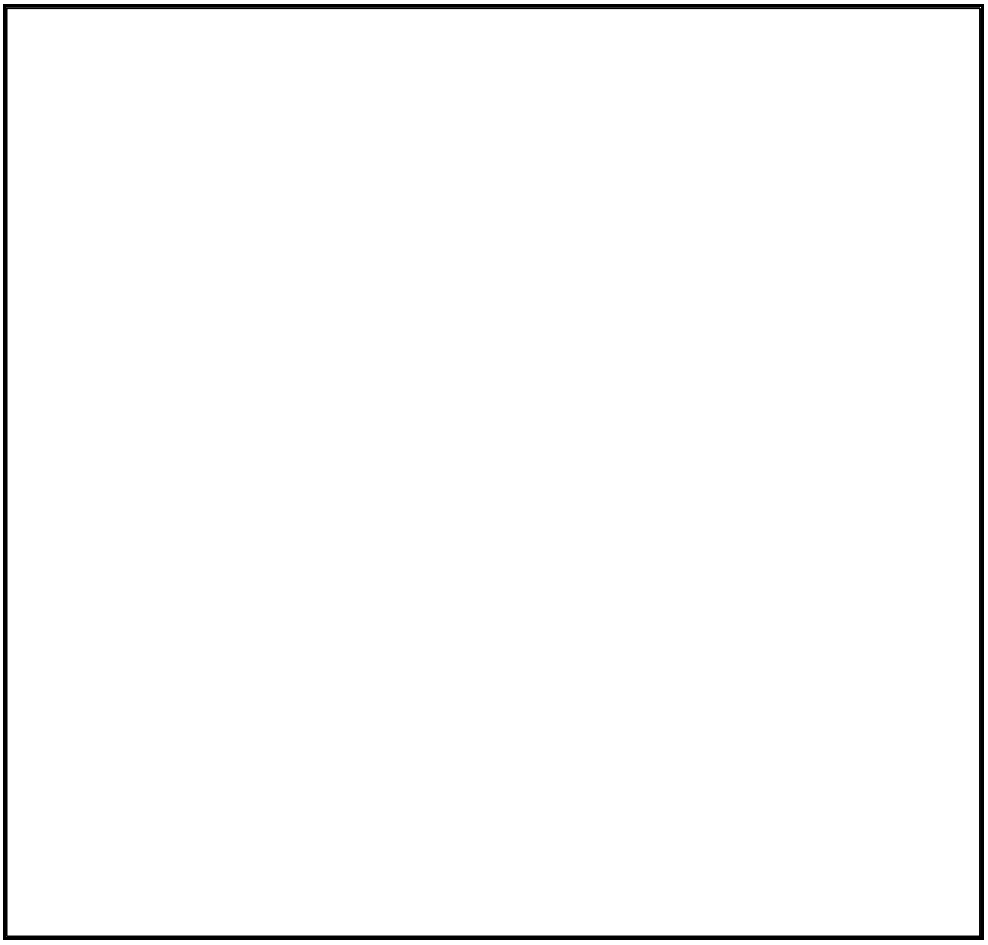


Figure 5: Dive Computer summary 30/04/2013

5.16.20. This dive was to the Cargo Holds 1 and 2 to a depth of 33.1 metres and requires two decompression stops of nine minutes at six metres and eleven minutes at three metres.

5.16.21. Looking at Dr OSUNSADE's dive profile, she has completed ten minutes decompression at six metres (including the time she left bottom) and ten minutes at three metres.

Comment:

5.16.22. Although Dr OSUNSADE has not completed the exact decompression stops required, her time at her maximum depth is short, and she has not remained at this depth for any period of time.

5.16.23. A dive computer constantly updates decompression stops based off depth and time, and given that there are no ceiling alarms present on this dive, I believe Dr OSUNSADE completed the decompression stops required, based off her dive computer.

5.16.24. After a 78 minute surface interval, Dr OSUNSADE, Mr KENT, along with an unknown tourist and the dive guide Mr TOA, all completed a dive at Million Dollar Point.

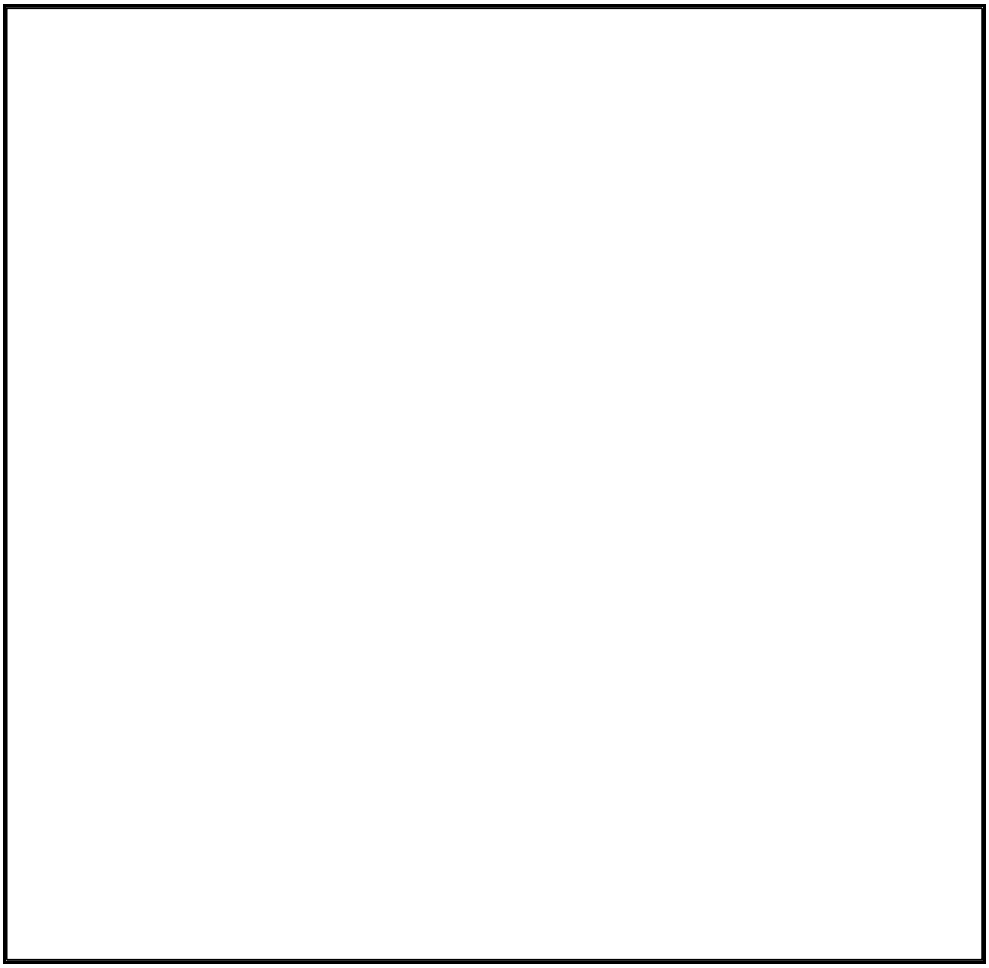


Figure 6: Dive computer summary 30/04/2013

5.16.25. This dive was to a depth 31.2 metres, and requires a two stage decompression, with stops at six metres for six minutes and three metres for ten minutes. Refer to section on Dive Tables for further information relating to my concerns around the short surface interval.

5.16.26. On this dive, Dr OSUNSADE has a poor decompression dive profile. She has not maintained a constant depth below six metres at her six metre decompression stop, and the same has occurred at her three metre decompression stop.

Comment:

5.16.27. Dr OSUNSASE was over weighted and had ill-fitting kit which would explain why her decompression dive profile is unacceptable.

5.16.28. However, at this dive site, the dive guides should have recognised this issue in the water and swam closer to the shoreline, whereby the group could complete the decompression stops kneeling on the sea floor.

5.16.29. This indicates a lack of planning, flexibility and experience by Aquamarine and their dive guides, and inexperience by Dr OSUNSADE.

5.16.30. This predisposes a diver to the risk of decompression illness, and suggests to me that Aquamarine and/or the dive guides are not paying enough attention to their customers during the decompressions stops.

5.16.31. On the morning of Wednesday 1 May 2013 at about 8:30am, the Deceased was uplifted by Aquamarine and taken to the SS President Coolidge by Aquamarine.

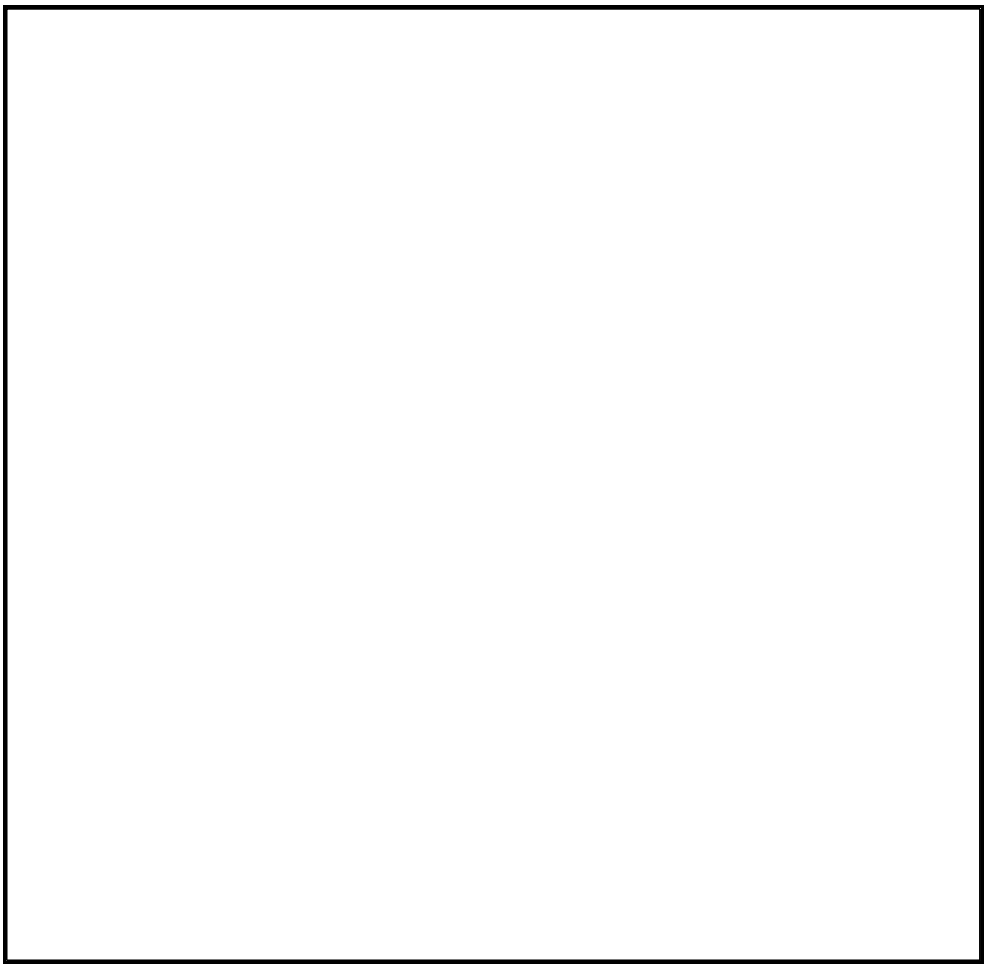


Figure 7: Dive computer summary 01/05/2013

5.16.32. During this dive to 'The Lady', Dr OSUNADE has resurfaced after a short dive to a depth of 15 metres. She has remained on the surface for four minutes, prior to leaving surface and continuing on the dive. It is not known why this occurred, nor was it mentioned in the interviews when I spoke to the dive guides.

5.16.33. This dive was to a maximum depth of 39.7 metres, which would require a three stage decompression, with stops at nine metres for seven minutes, six metres for eight minutes and three metres for 19 minutes, if the bottom was for 25 minutes.

5.16.34. On this occasion, it would be prudent to treat this dive as a 22 minute dive, given the short 15 metre deep dive at the start of the dive. Again, Dr OSUNSADE does not have a good decompression dive profile.

Comment:

5.16.35. There is no excuse for this as these decompression stops should be completed with divers kneeling on the sea bed or using datum lines, as it is the safest method of controlling divers.

5.16.36. I am unable to explain the poor dive profile for Dr OSUNSADE whilst she is on her decompression stops at the end of her dive. However, I do note that there are no ceiling alarms present on her dive computer, so no decompression stops have been breached. This is most likely due to her dive profile, with only a short duration spent at her maximum depth.

5.16.37. On this occasion, a 4 hour 13 minute surface interval was given between dives, which allows the body time to off-gas, see Section 10 – Dive Profiles

5.16.38. The afternoon dive was to the Medical Supplies, and was to a maximum depth of 30.2 metres.

5.16.39. The decompression stops at the end of the afternoon dive are clear, and raise no concerns.

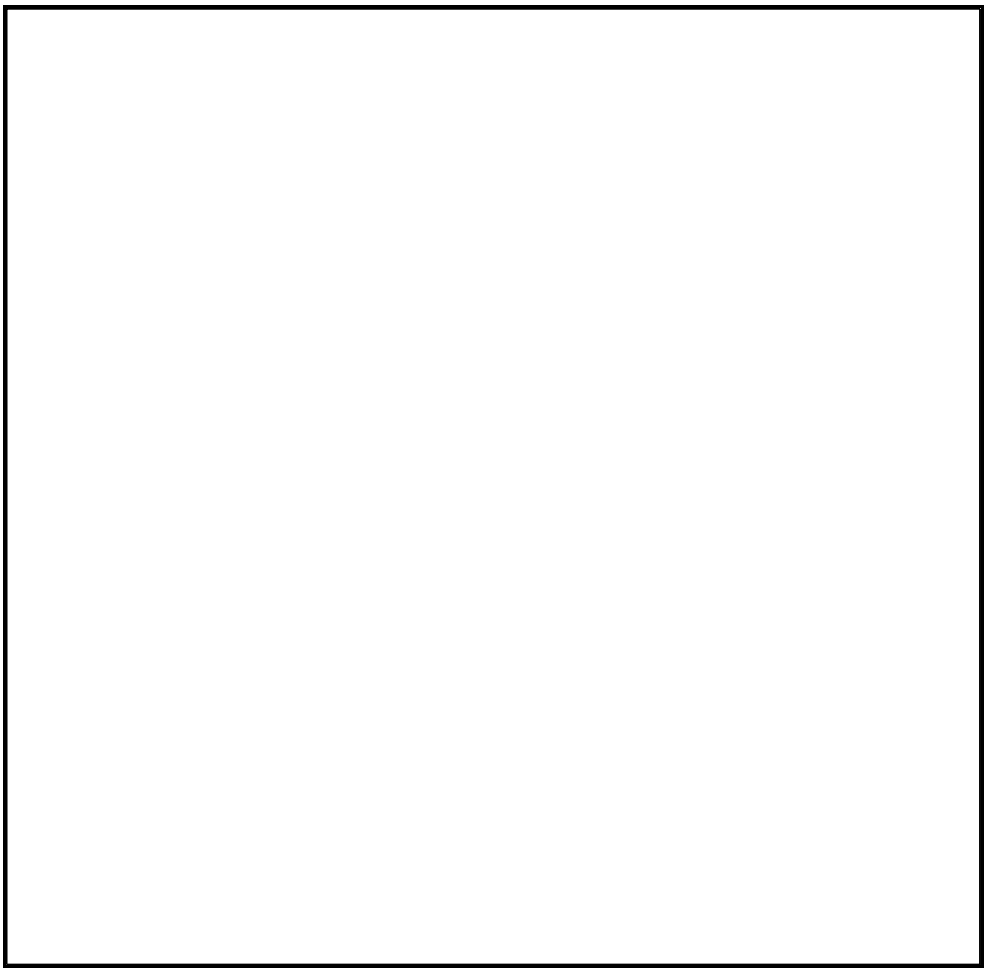


Figure 8: Dive computer summary 01/05/2013

5.16.40. On the morning of Thursday 2 May 2013 at about 8:30am, the Deceased was uplifted by Aquamarine and taken to the SS Present Coolidge.

5.16.41. The Deceased's fatal dive profile below shows her descending to a maximum depth of 42 metres with several ascents and descents before the dive computer records no vertical movement after 16 minutes, at a depth of 41 metres.

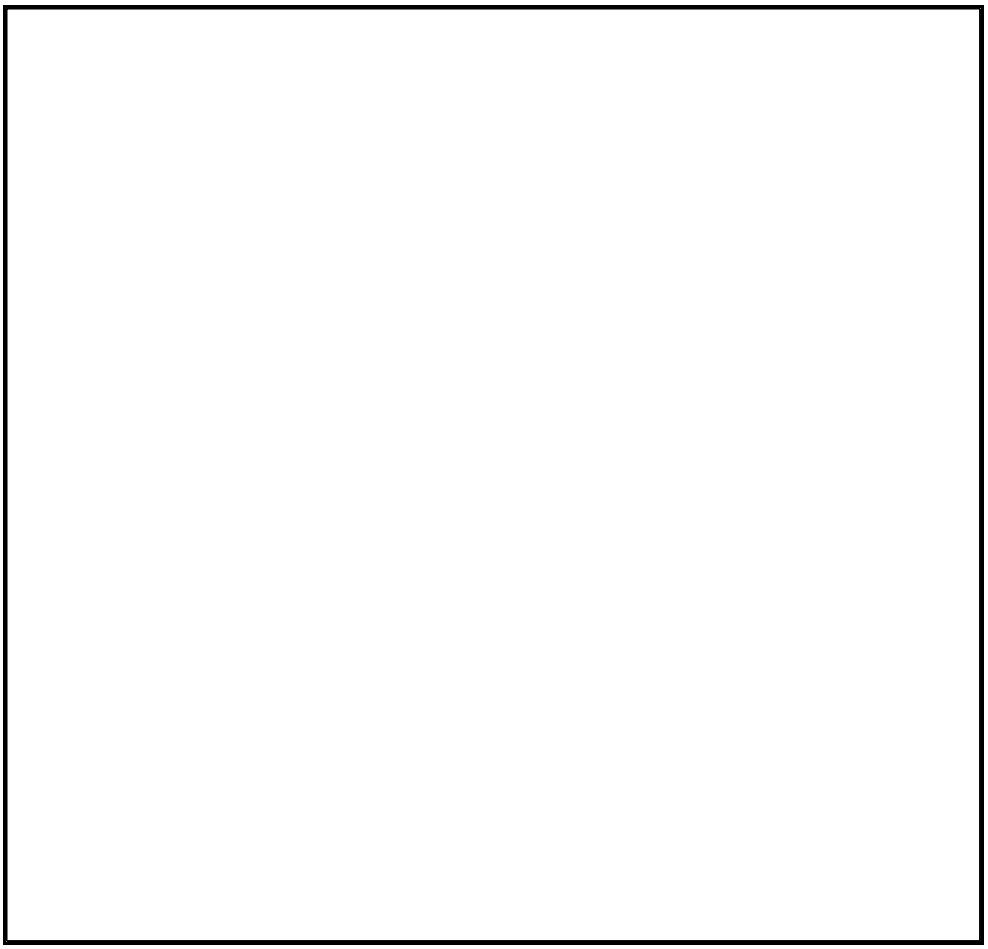


Figure 9: Dive computer summary

5.16.42. From the data obtained from this dive, and through correspondence with other divers who have recently dived the SS President Coolidge, the following can be deducted from the Deceased's dive profile:

- The ascent at three minutes into the dive is the Deceased swimming down the rope from the decompression stop area to the bow of the SS President Coolidge, then ascending slightly as the Deceased followed the curvature of the bow up towards the forward gun.

- The slight change in the descent profile at seven minutes and at a depth of 27 metres is the Deceased entering Euart's Door, starting the penetration dive towards 'The Lady'.

- The ascent and descent between nine and 12 minutes, is believed to be the Deceased in the first class dining room or in the lobby, prior to her moving onto B Deck.

- The Deceased has, according to Mr JEREMIAH's account, been located on B Deck only a short distance from the stairwell, close to the bulkhead near 'The Lady'. This is the Deceased's final resting place, until she was located 50 minutes after starting the fatal dive.

- On the ascent, when both Mr JEREMIAH and Mr TONY move through Euart's Door with the Deceased at 52 minutes, a change in the ascent profile can be seen at a depth of 27 metres.

5.16.43. Based off the dive profile from the Deceased's dive watch, I believe Mr TOA's statements that he provided to Corporal SOLWIE on Thursday 2 May 2013, the Vanuatu Police CID Investigator on Friday 3 May 2013, and subsequently the statement to myself in March 2014, cannot be relied upon, as there are discrepancies between his statements and the Deceased's dive profile in their entirety.

5.16.44. However, Mr TOA's statements up to, and just after, Dr OSUNSADE reached 'The Lady', I believe are credible.

5.16.45. In all interviews, Mr TOA told Vanuatu Police and me, both he and the Deceased exited the wreck of the SS President Coolidge and they swam towards the bow. I believe this did not occur for the reasons below:

5.16.46. In the statement I took during the March 2014 interview with myself, Mr TOA stated:

5.16.47. *"We did not reach "The Lady', but she give me the signal something wrong".*

5.16.48. *I don't know what depth we got to".*

5.16.49. *"She signal she wanted to go back where we had come in".*

5.16.50. *"We swam back to the door, I come out first, I wait for her".*

5.16.51. *"She came out at the door that leads to 'The Lady', and she pointed towards the bow".*

5.16.52. *"… we started to swim up towards the bow, I looked around to check on her again*

5.16.53. Given the timeframe since the incident, it is expected for there to be minor differences in the statements. However, I believe there are doubts that Dr OSUNSADE exited the wreck through Euart's Door (located at a depth of 28 metres approximately) as her depth is too deep and there is no change in the ascent rate at Euart's Door on the Deceased's dive profile.

5.16.54. However, another diver completing the Promenade Deck dive, Mr AULD, believes he saw Dr OSUNSADE at the end of his dive at a depth of 30 metres when he was heading back to the decompression stop area. Mr AULD believes he saw a female diver matching that of Dr OSUNSADE, two to three metres above the ship's hull, and eight metres away to his left.

5.16.55. This I believe is not a sighting of Dr OSUNSADE due to:

- Time frame given: - Mr AULD and his dive guide were completing a dive to The Promenade Deck, maximum depth of this dive is 33 metres. He was the first into the water. In an initial phone call to Mr AULD he stated he saw Dr OSUNSADE and her guide pass him when he was having difficulties equalising with sinus issues. In later emails, Mr AULD rescinds that statement. According to Mr AULD, he observed a diver matching Dr OSUNSADE approximately 15-20 minutes after the start of his dive, with the diver observed heading towards the stern. Dr OSUNSADE was Deceased at or about 16 minutes, according to her dive computer (constant depth, no movement from this point on until she is located by Mr JEREMIAH). Mr AULD believes he had between 30 and 70 Bar of air remaining when he saw the diver matching Dr OSUNSADE. This indicates to me Mr AULD has completed a 20 to 25 minute dive, and he is running low on air.

- Depth: Mr AULD advises he was at a depth of 30 metres when he saw this diver two to three metres above the wrecks hull and at a distance of eight metres from him. This does not match Dr OSUNSADE's dive profile.

- Known time and point of entry to Euart's Door: Below is Dr OSUNSADE's fatal dive profile, in Figure 10. The red circle shows Dr OSUNSADE navigating past Euart's Door. This is at a depth of 28 metres approximately, and at around eight minutes into her dive (note the dive start time according to the downloaded data is not exact as Dr OSUNSADE's dive watch only started recording at a depth of three metres). This I estimated to be around nine to ten minutes on Mr AULD's dive, but this is an assumption, and is based off Mr AULD trying to get into the water before Dr OSUNSADE and her guide.

- Ascent prior to death: As shown in Figure 10 (indicated by the green circle) Dr OSUNSADE completed a short ascent, prior to dropping down to a depth of 41 metres approximately. At this point if a diver is on either B Deck or at C Deck, there is no direct access to the exterior of the ship, without swimming some distance along either deck. From C Deck where 'The Lady' is located, the most direct access to the exterior of the wreck is via Euart's Door. On either B Deck or C Deck, I believe you can also swim towards the bow, and exit via the forward cargo holds.

- Dr OSUNSADE's dive profile and location being inside the wreck, makes it impossible to match the location where Mr AULD believes he saw her. Also Dr OSUNADE and Mr TOA would have been seen by other divers if they were behind any other group entering through Euart's Door, and as they were not, this means Dr OSUNSADE and Mr TOA were ahead of the Australian group.

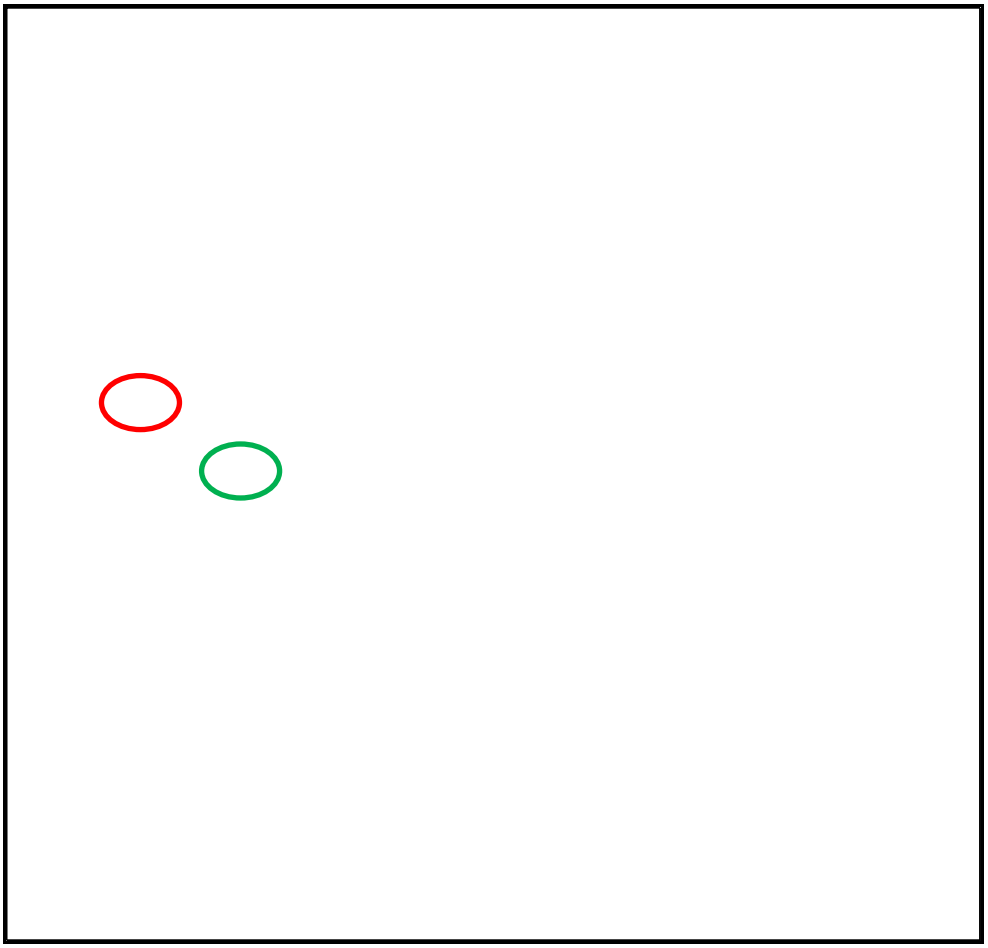


Figure 10: Fatal Dive computer summary

5.16.56. I believe the Deceased has become separated from the dive guide Mr TOA at or in the vicinity of 'The Lady', but given they were on a one-on-one guided dive, I cannot explain how or why she could have become separated.

5.16.57. I have concerns around Aquamarine and the dive guides taking divers on deeper dives, when the tourist(s) are outside their training/experience, and most likely their comfort zones.

5.16.58. When Dr OSUNSADE was making email enquiries into diving with Aquamarine in early 2010 after Mr SYED had purchased the business, the following information was sent to her by email from Mr SYED, knowing that she had completed 13 dives as an advanced open water diver.

5.16.59. At that time Mr SYED advised: "*We offer two dives a day for SS President Coolidge and Million Dollar Point. One is in the morning and one in the afternoon. All dives are guided by our highly trained dive guides. Please see table below for suggested dive plan on the SS President Coolidge and the Million Dollar Point*".

Day	**AM Dive**	**PM Dive**
Day 1	Promenade Deck (33m)	Cargo Hold 1 & 2 (33m)
Day 2	The Lady (40m)	Medical Supplies (35m)
Day 3	Engine Room (48m)	ABC Decks (36m)
Day 4	Swimming Pool (55m)	Million Dollar Point (15-40m)
Day 5	The Stern (60m)	Cargo Holds 1 & 2 Night Dive (33m)
Day 6	The Gauntlet (56m)	Crows Nest (35m)
Day 7	Cargo Holds 6 & 7 (56m)	Captains Bathroom (35m)
Day 8	The Gallery (57m)	20mm Cannons (36m)
Day 9	Doctors Office (55m)	Bow and Chain Locker (30m)
Day 10	Soda Fountain (55m)	Your choice max 40m

5.16.60. I believe this indicates that in 2010 Aquamarine used set dive plans and they didn't take into account the ability of a diver, and were taking divers significantly past their level of training and experience.

5.16.61. Three years later, I believe the same has occurred again as Dr OSUNSADE has completed all dives shown above on days one and two, then on her sixth dive she was potentially being taken to the Doctors Office.

5.16.62. In Dr OSUNSADE's case, even after other divers complained about a short dive after her high air consumption, and having to use a spare dive cylinder on decompression, Aquamarine and the dive guide allowed her to dive deep again, potentially planning to dive to the Doctors Office which is located at a depth of 55 metres.

5.17. BCD - Buoyancy Compensating Device

Make:	Vector
Model:	Mares weight integrated
Colour:	Black
Age:	Unknown
Size:	XL
Owner:	Santo Island Fish and Dive

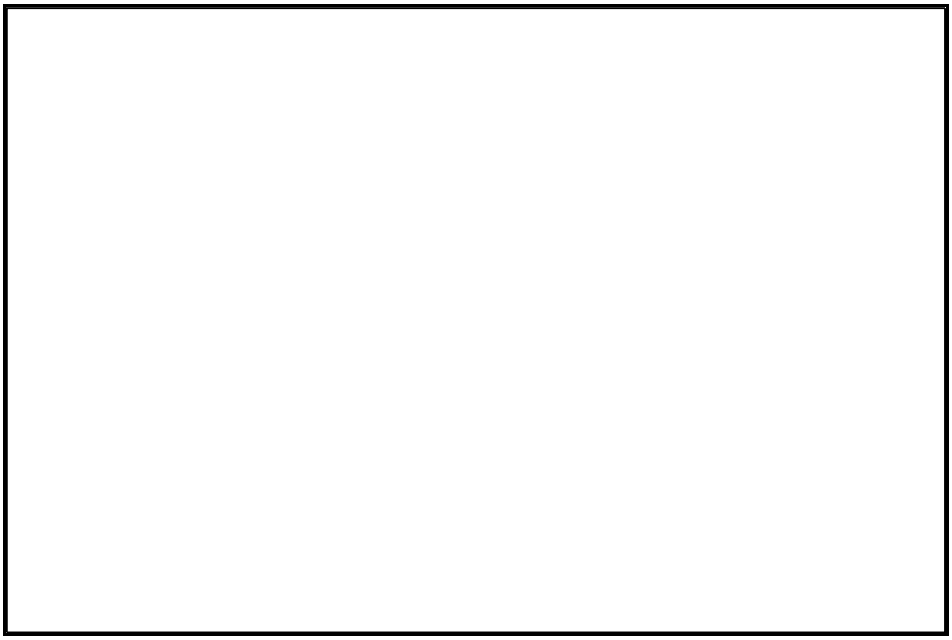


Photo 50: Front view of Buoyancy Compensating Device (BCD)

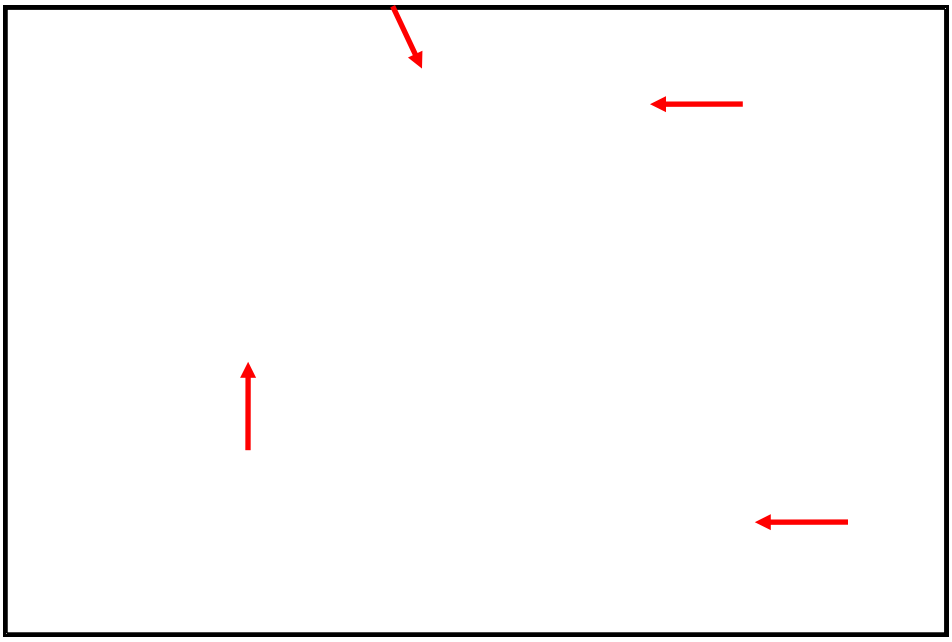


Photo 51: Rear view of BCD showing dump valves

5.17.1. The role of a BCD is to assist a diver in maintaining and managing different states of buoyancy above and below the surface. The BCD also secures the dive cylinder to the diver's back.

5.17.2. The diver adds air to the BCD as they descend to maintain neutral buoyancy, and as they ascend they release/dump some of the contents so they do not rush to the surface. On the surface the diver may inflate the BCD to remain buoyant like a life jacket.

5.17.3. Air is supplied to the BCD from the cylinder via the inflate button on the low-pressure inflator hose or it can be inflated orally by the diver.

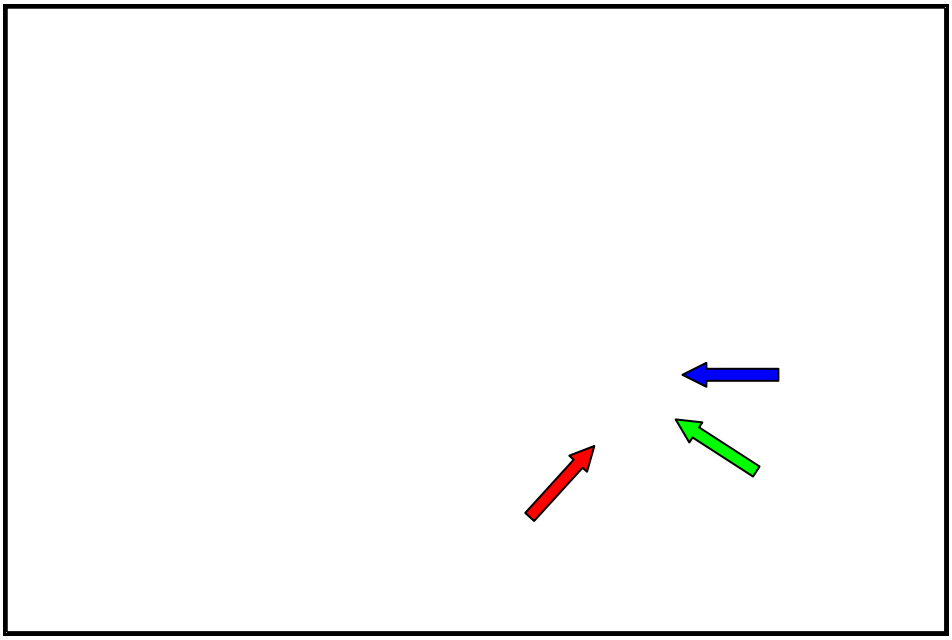


Photo 52: BCD Inflator

Red arrow indicates the deflate button
Green arrow indicates the inflate button
Blue arrow indicates the low pressure inflator hose connector

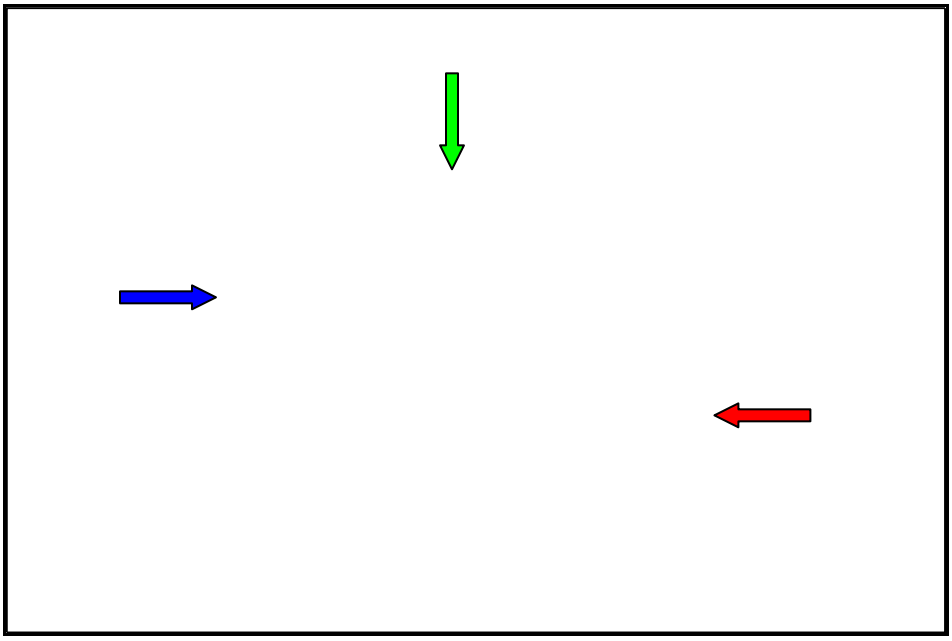


Photo 53: Close up of BCD Inflator

Red arrow indicates the deflate button
Green arrow indicates the inflate button
Blue arrow indicates the low pressure inflator hose connector

5.17.4. The air line from the regulator first stage was initially difficult to attach due to the dive gear not being washed down with fresh water after being seized by Vanuatu Police.

5.17.5. After a couple of attempts, the residue salt build up was removed, and the air line correctly attached to the BCD inflator. It did not have any visible signs of damage or wear and tear.

5.17.6. The BCD was tested and was found to hold air put into it. However, when the dump valves were tested, the manual shoulder dump valve on the dump hose was found to be faulty in that it did not dump air when pulled on.

5.17.7. On close inspection, the pull cord was present and attached.

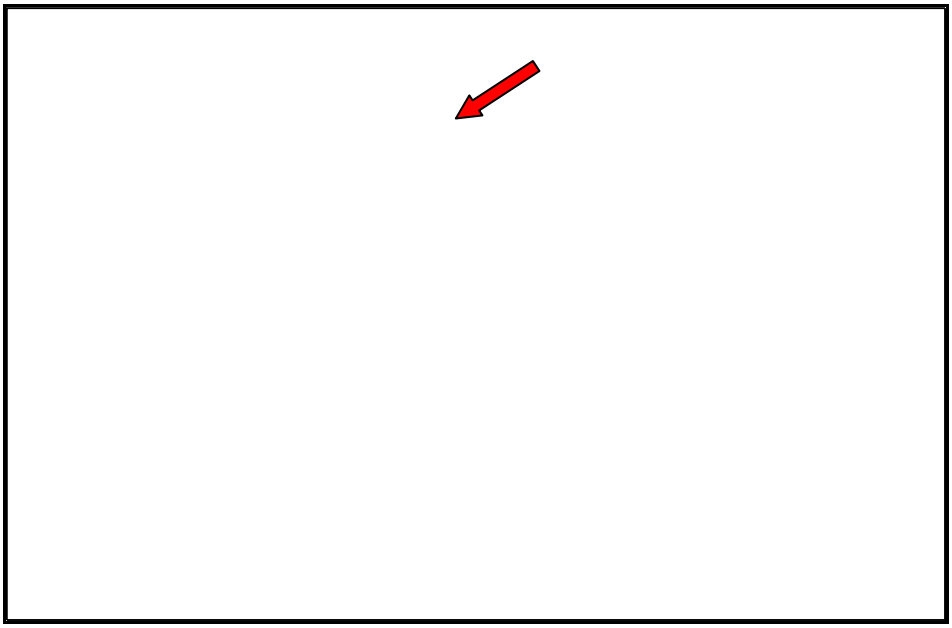


Photo 54: Photo of BCD Dump Hose disassembled

Arrow indicates where pull cord attaches to interior of the BCD inflator hose

5.17.8. Although this may cause a diver to stress in the event of an unintentional ascent, the dump valve on the inflator mechanism was functional, as were the remaining dump valves located around the BCD.

5.17.9. On Monday 29 April 2013, Dr OSUNSADE was sized up for dive equipment from Aquamarine.

5.17.10. When interviewed in March 2014 by myself, Mr SYED stated his rental XXL BCD was not big enough to fit Dr OSUNSADE.

5.17.11. Mr SYED contacted Mr Malcolm DAVIES (Owner of Santo Island Dive and Fish), who had a size XL Mares Vector BCD.

5.17.12. Mr DAVIES brought the size XL BCD he had to Aquamarine for Dr OSUNSADE to try on. The BCD fitted Dr OSUNSADE, and was subsequently used for her diving whilst in Espiritu Santo.

Comment:

5.17.13. Although it may seem minor, the size of the BCD as quoted by Mr SYED is inaccurate, and is just one of a number of inconsistencies found within the statement of Mr SYED during the interview with me.

5.17.14. Enquiries with Mr Scott CHAPMAN from Australia Underwater Products, reveal Aquamarine have only purchased up to a size medium GBR BCD, and that the largest BCD available in the GBR model is a size XL, not XXL as stated by Mr SYED.

5.17.15. It is not known if Dr OSUNSADE tried to use the manual pull cord function built into the left shoulder dump valve. This is a standard practice to dump air for the BCD.

5.17.16. If this function was attempted to be used by Dr OSUNSADE and it failed as in our testing, it could cause the onset of panic should an unintentional ascent begin, and she was unable to stop her ascent.

5.17.17. However, looking at her dive profile on the fatal dive, I do not believe this to be a factor, as she completed a short ascent, followed by a descent, within the wreck. Also, Dr OSUNDADE was over weighted and would have been negatively buoyant.

5.17.18. The two other dump valves operated correctly, as did the deflator button when tested. All buckles functioned correctly and during the test dive in a pool it was found that besides the faulty shoulder dump valve, the BCD functioned correctly.

5.17.19. On close inspection of the rubber O-ring around the left shoulder dump valve, the O-ring was observed to be perished, and in need of replacing.

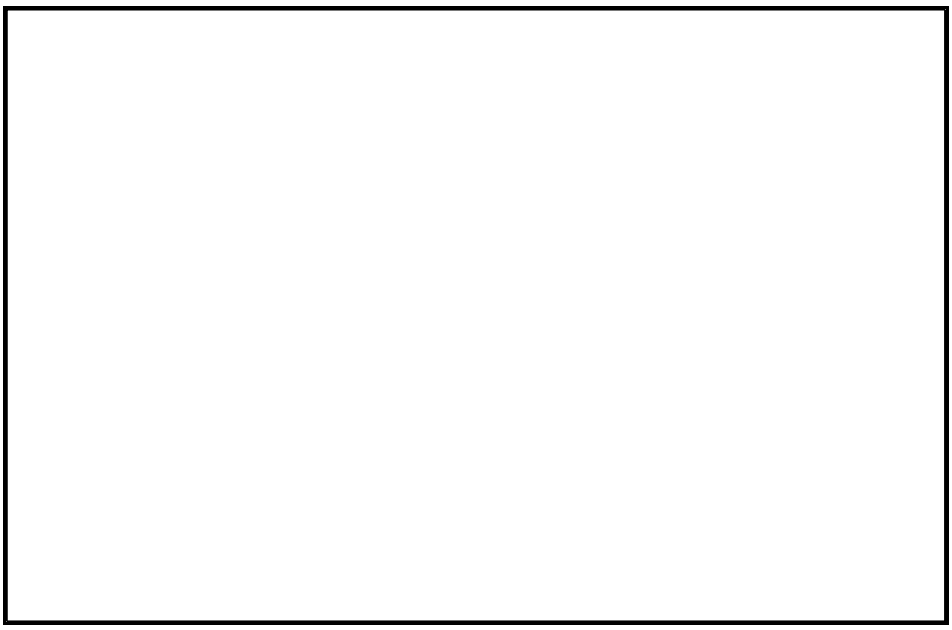


Photo 55: Close up of BCD Dump Hose shoulder O-ring

5.17.20. Although the O-ring was perished, the test prior to disassembly showed the BCD held the air put into the bladder. Therefore I believe the O-ring did not contribute to the death of Dr OSUNSADE.

5.17.21. I believe this suggests the BCD has not been serviced fully in some time, or that the perished O-ring was not detected or has occurred since the last service.

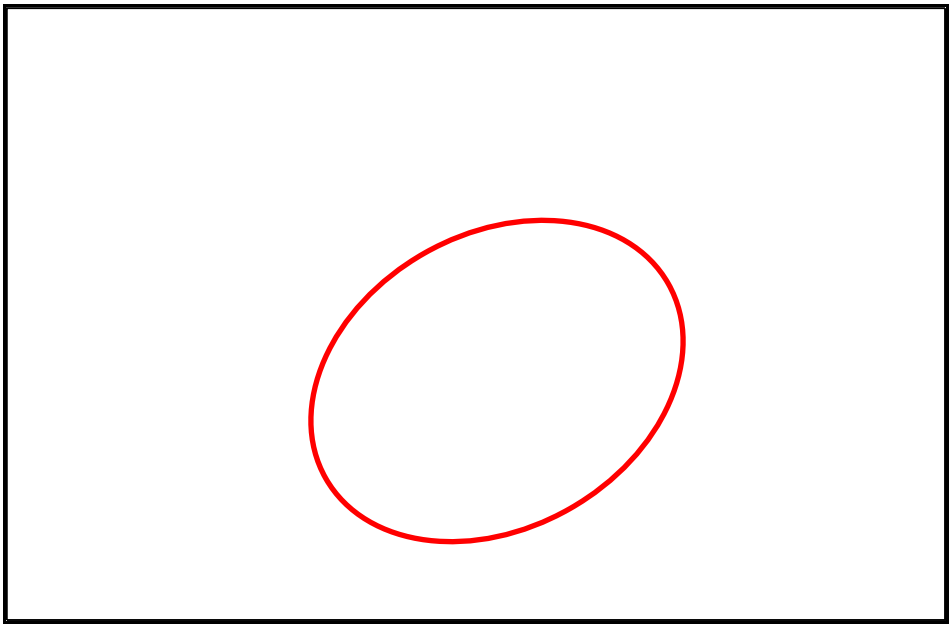


Photo 56: Close up of BCD - hole in weight pocket

5.17.22. This model of Mares BCD originally came with weight integrated pockets. This form of weighting system removes the need for a diver to wear a weight belt around his or her hips.

5.17.23. The weight pockets either clip into or velcro onto the BCD. In this BCD however, over time the weight pocket housing and securing mechanism have worn and are no longer able to be used on this BCD.

5.17.24. This also suggests the BCD is old, or has had a very hard life. I would expect a BCD in this condition to be replaced if it were rental gear.

5.17.25. However, in this case the BCD remains functional, albeit the diver has to wear a conventional weight belt on their hips.

5.17.26. I do not believe the BCD to be a contributing factor towards the death of Dr OSUNSADE, although I do note there is wear on the exterior, and the BCD is in need of servicing/replacing the faulty dump valve.

5.18. Weight Belt

Make: Web Weight Belt with mesh pockets
Colour: Black
Weight: 9.325 kilograms

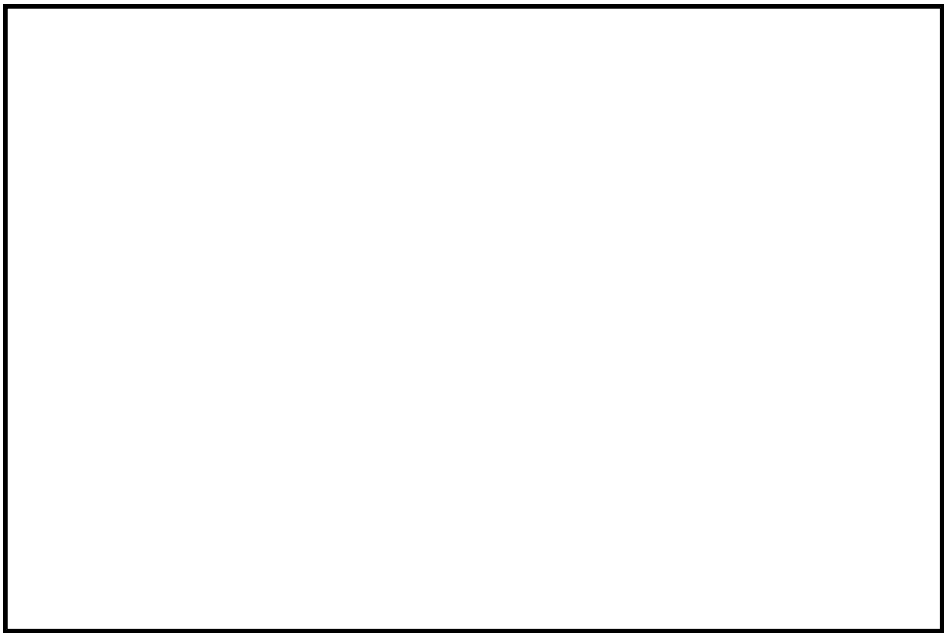


Photo 57: Weight Belt

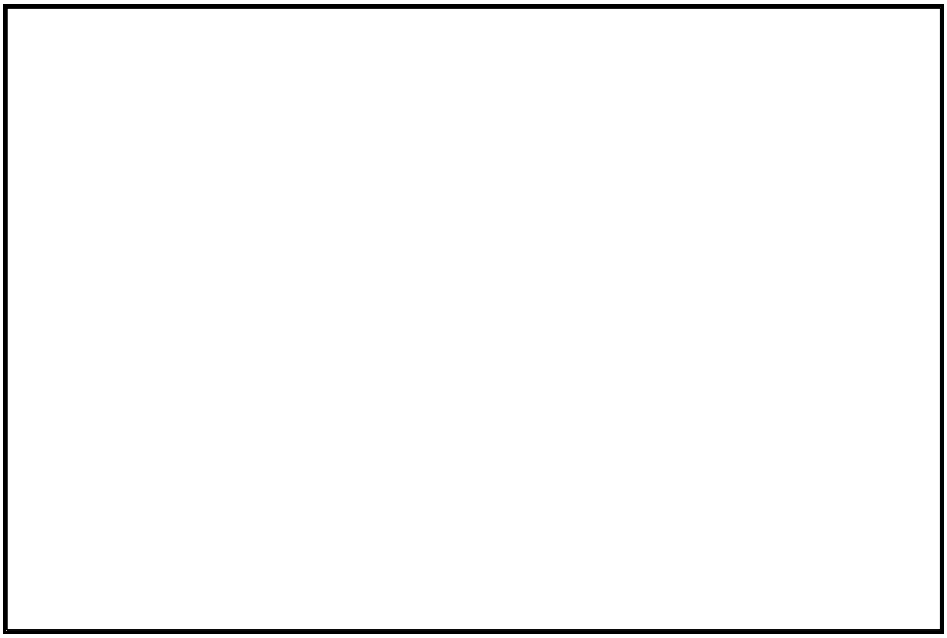


Photo 58: Weight Belt with weights removed from pockets

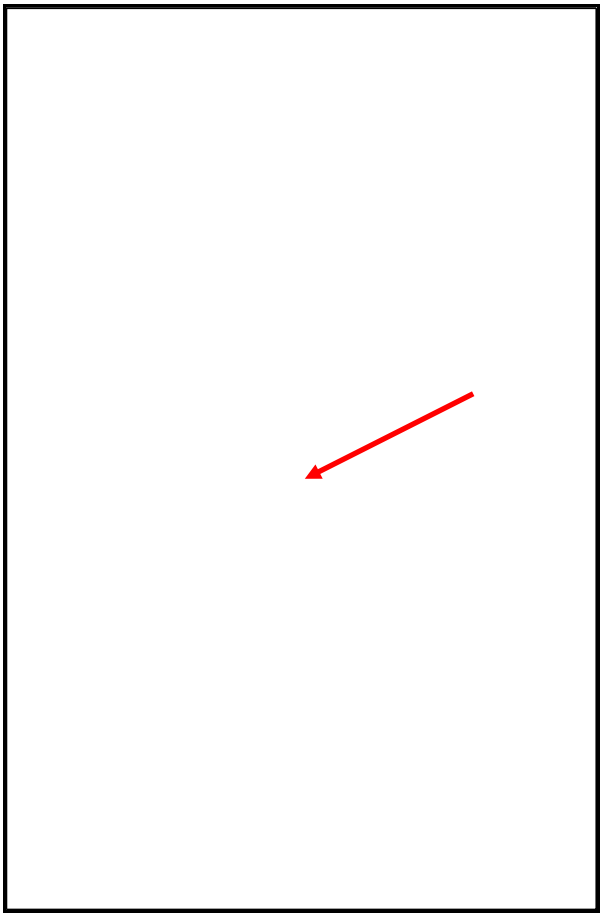


Photo 59: Weight 1.14 kilograms fixed to the BCD

<u>Note:</u> This weight attached to the cylinder strap cannot be dumped in an emergency, and is not a recommended practice.

5.18.1. Weight is worn by a diver to compensate for the positive buoyancy created by the equipment used and the divers own body composition.

5.18.2. The amount of weight a diver must carry is subject to a number of factors such as body size, build, equipment worn and water being dived in. The general rule in maintaining correct buoyancy is that the diver should be neutrally buoyant on the surface.

5.18.3. Neutral buoyancy means that a diver can hang comfortably on the surface with the water line at their eye level without the assistance of using fins or their BCD.

5.18.4. The onus is on the diver to maintain and adjust their buoyancy, either by adding or removing weight as required.

5.18.5. Excessive weight will require a diver to rely more on their physical effort to reach and remain on the surface, due to negative buoyancy. This in turn will cause the diver to become exhausted and stressed due to being under physical exertion to move about whilst diving and on the surface.

5.18.6. Insufficient weight will require a diver to again rely on physical exertion to stay submerged under the water, which too can cause the diver to become exhausted and stressed.

5.18.7. Insufficient weight can also lead to a fast ascent and risk of a diving illness or injury. I do not believe it is applicable to this case as Dr OSUNSADE was wearing a rash suit (no buoyancy), and video footage shows her at times in a head up/feet down position, indicating either overweighting or a lack of buoyancy skill.

5.18.8. The Deceased's logbook indicates that on the odd occasion she wore a rash skin suit and on other times a wetsuit in Bali, whereas in Thailand she indicates on the odd occasion she wore a rash suit. This indicates to me inexperience, as the entries being made in her log book are not clear, but the weight worn remains fairly consistent for tropical diving.

5.18.9. During those dives the weight varied between 8kg and 10kg.

5.18.10. The weight belt the Deceased was using weighed 9.325kg, and together with the weight attached to the cylinder strap on the BCD of 1.14kg, the Deceased was wearing just over 10.465kg of weight on the fatal dive.

5.18.11. I believe that at almost 10.5Kg, with no wetsuit providing buoyancy, the Deceased was very negatively buoyant.

5.18.12. This is a consistent weight Dr OSUNSADE used during her PADI Peak Performance Buoyancy course, when she was diving in Bali with a rash skin suit.

5.18.13. During that course in Bali, Dr OSUNSADE should have been instructed and weighted correctly for diving in the tropics.

5.18.14. I do not know why Dr OSUNSADE was carrying so much weight.

5.18.15. Incorrect teaching techniques during this course or diver inexperience, could have lead Dr OSUNSADE to believe she had been weighted correctly, and could explain why she was using too much weight for the diving in Vanuatu.

5.18.16. However, it is also up to Aquamarine and their dive guides to ensure that each diver is weighted correctly, prior to leaving the surface for their first dive.

5.18.17. This shows a lack of experience or a lack of attention to detail by the dive guides and or management from Aquamarine.

5.18.18. As recorded in her logbook, during the time the Deceased was diving at Aquamarine, she started with 10kg for several dives, then dropping this to 8.5kg for one dive, before diving with 10kg again.

5.18.19. All weight systems have a buckle or similar 'quick release' system to allow abandoning of the weight in emergencies. This causes the diver to become positively buoyant.

5.18.20. The Deceased was found with her weight belt still worn. Even if the Deceased had ditched her weight belt, she would have been held within the wreck. If the Deceased had a need to ditch her weight belt outside the wreck of the SS President Coolidge, she could have ascended directly to the surface, (as shown by testing completed by Police National Dive Squad in a pool).

5.18.21. Dr OSUNSADE used a weight belt with a quick release plastic buckle that was found to function correctly when tested.

5.18.22. In addition, the Deceased has a single weight attached to her BCD cylinder strap. When the dive guides were questioned, they were unable to explain why the weight was there on the fatal dive.

5.18.23. Mr TOA when interviewed told me Dr OSUNSADE herself put the single weight on her BCD cylinder strap.

5.18.24. It is possible this was a normal practice by the Deceased, but given the position of the weight, it would tend to make a diver more upright in the water.

Testing

5.18.25. Buoyancy tests conducted by PNDS using a male of similar height and weight as the Deceased, using the BCD, regulators, weight belt and dive cylinder, proved the Deceased was over weighted. Although this is a subjective test, PNDS testing showed it took only 1.14 kg weight for the test subject to be neutrally buoyant and be able to leave the surface wearing dive gear.

5.18.26. This subjective testing indicates the Deceased was using in excess of 9kg of extra weight, and would explain why the Deceased was swimming in a near vertical motion on some dives, as shown in the videos.

5.18.27. It would also explain the rapid breathing rate of the Deceased, as she had to work hard in water to maintain neutral buoyancy. It would lead to fatigue, excess consumption of air supply, and combined with other factors i.e. being alone in a wreck, losing fins, as well as the poor supply of air from the regulator, it would be my opinion that this lead to panic.

5.18.28. I believe this is a contributing factor in the death of Dr OSUNSADE.

5.18.29. It is a basic diver error and indicates diver inexperience, and a lack of oversight by Aquamarine.

5.19. Wetsuit

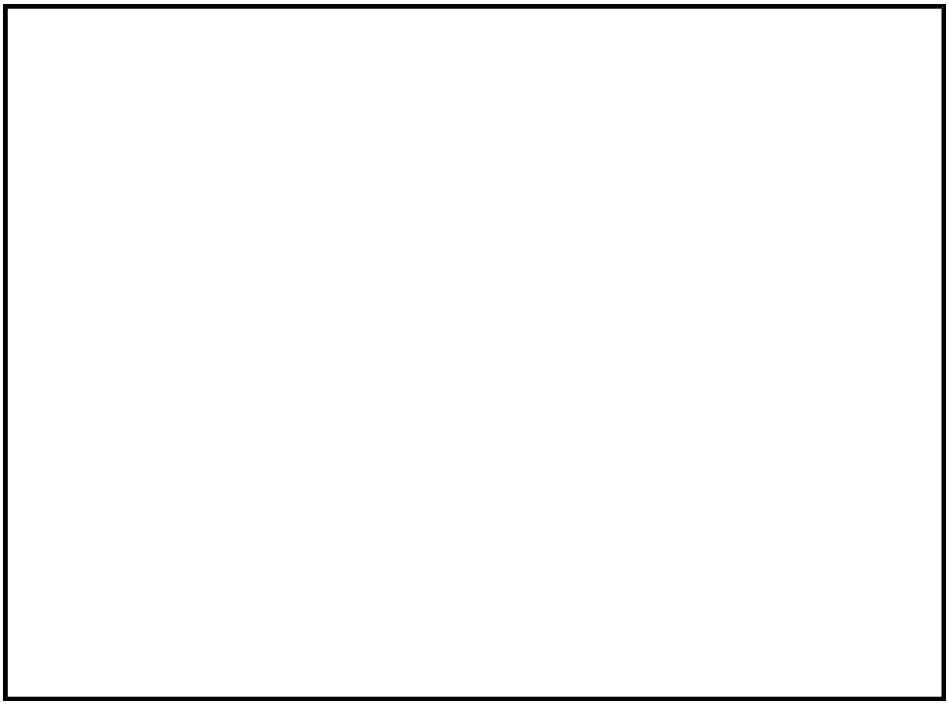


Photo 60: Dr OSUNSADE (right of picture) wearing a rash suit

Image downloaded from http://www.michaelmcfadyenscuba.info/viewpage.php?page_id=893 on 5 June 2014

5.19.1. A wet suit is worn to provide warmth and protection to the diver.

5.19.2. Wetsuits are constructed of neoprene and give the diver added buoyancy.

5.19.3. This combined with the diver's own body composition is compensated with the wearing of a weight belt.

5.19.4. The Deceased during her diving did not wear a wetsuit, but instead wore a thin rash suit as pictured above.

5.19.5. Given the warm temperature of the water in the tropics, I don't believe the lack of a wetsuit being worn to be a contributing factor to the death of the Deceased, but when combined with the excess weight this demonstrates inexperience by the Deceased and oversight by Aquamarine.

5.20. Dive Boots

Make: Aqualung
Model: Soft sole
Size: 11
Colour: Black / Grey

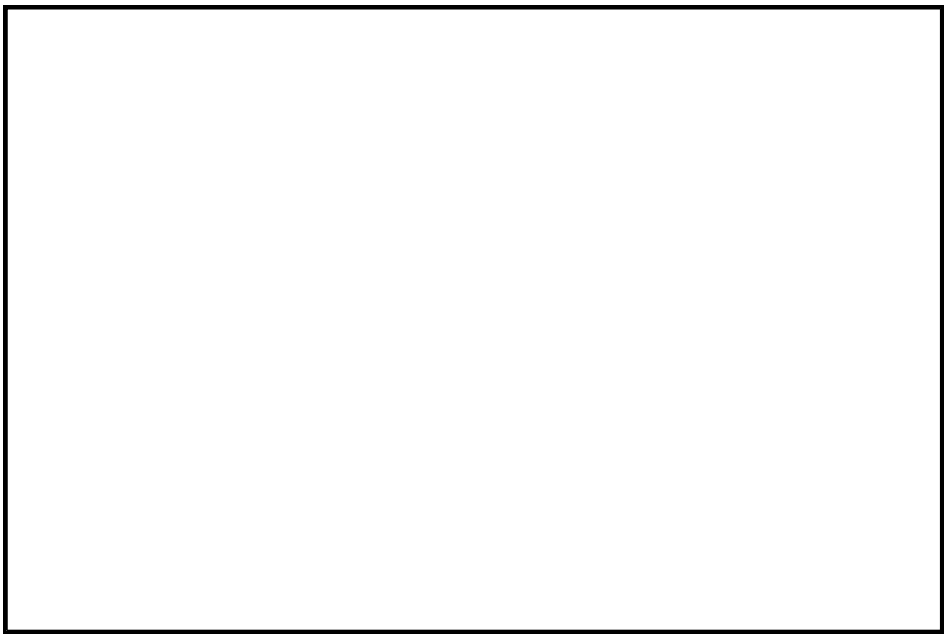


Photo 61: Wetsuit Booties

5.20.1. The wet suit booties worn by the Deceased were in good condition and functioned correctly.

5.20.2. Enquiries by PNDS with the husband of the Deceased reveal the Deceased wore size 8 UK shoes. Based off this information, I believe the Deceased should have been wearing either a size 7 or 8 dive boot.

5.20.3. Tests conducted by PNDS using a female of the same shoe size as the Deceased, show the size 11 Aqualung dive boots are several sizes too big, with approximately 25 mm of space remaining in the front of the dive boot.

5.20.4. This raises concerns over Aquamarine fitting out their customers with the ill-fitting dive gear.

Comment:

5.20.5. This also highlights inexperience by the Deceased in using ill-fitting equipment (fins/dive boots). She should not have accepted the ill-fitting equipment from Aquamarine.

5.20.6. In water, Dr OSUNSADE would possibly have had to work harder to be able to kick effectively due to the potential for movement of her feet within the dive boot itself.

5.20.7. I believe this could have contributed to her death, when under stress. This could also explain/contribute to the Deceased losing her fins during the fatal dive.

5.21. Fins

Make:	Mako
Model:	Aeris
Size:	Extra-Large
Colour:	Black
Owner:	Aquamarine

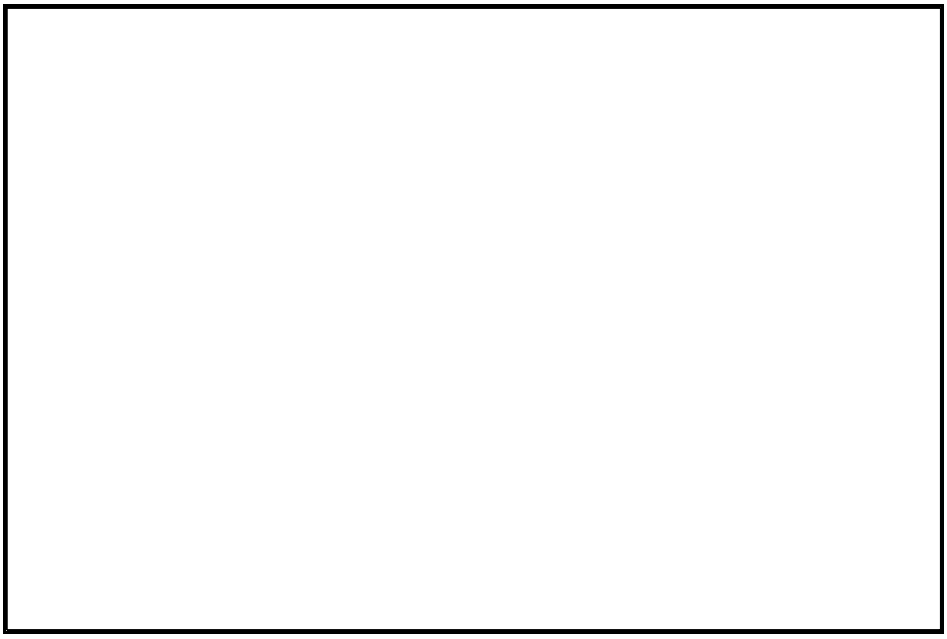


Photo 62: Fins

5.21.1. Fins are worn by a diver to provide propulsion through the water.

5.21.2. The Deceased was wearing fins provided by Aquamarine. The type of fins Aquamarine use are Mako Aeris, the same make and model that was recovered by Mr Alfred LASA in close proximity to where the Deceased was found by Mr JEREMIAH.

5.21.3. On the fatal dive, the Deceased was located by Mr JEREMIAH without fins on.

5.21.4. PNDS testing using the same female who tried on the dive boots of Dr OSUNSADE's also tried on the fins. In order for the test subject to fit the fin, she had to tighten the straps up completely, but did not notice any movement of her feet in the fin itself besides the dive boot.

5.21.5. This may change once in water, but this subjective testing raises the possibility that Dr OSUNSADE may have had to work harder due to wearing dive boots and fins that were too big and/or too loose, as well as being negatively buoyant.

Comment:

5.21.6. I contacted a local dive shop in September 2014 and measured a size small, regular and XL Mares dive fin.

I noted the blade of all fins to be all the same length, but the foot cavity width varied by as much as 20mm from the size small to the size XL. Also the length of the foot cavity varied by 40mm between the size small and XL fin.

5.21.7. I believe Dr OSUNSADE should have been wearing size small dive fins.

5.21.8. This results in a diver having to expel extra energy to fin through the water, as the kick cycles are not effective due to the fins moving around the foot.

5.21.9. It is also not certain the fin handed to me by Mr LASA was the same fin used by the Deceased. However, given witness statements from Mr LASA, who found two fins on B Deck close to where Mr JEREMIAH found the Deceased, there is a reasonable assumption they were used by the Deceased on the fatal dive.

5.21.10. The second fin according to Mr LASA was returned to Aquamarine shortly after it was located on B Deck on the SS President Coolidge.

5.21.11. The fin is in reasonable condition and the buckles work correctly.

5.21.12. If these fins were used by the Deceased, it is my belief they could have contributed to the death of the Deceased as they were the wrong size for her.

5.21.13. I believe this has added anxiety/stress on the Deceased, in conjunction with other factors such as fatigue, alarm, panic, being unable to swim effectively.

5.21.14. I believe this has resulted in her fins coming off her feet, rendering Dr OSUNSADE being unable to swim through the water due to being over weighted with excess weight on her weight belt, which has likely compounded her stress levels and has led to her death.

5.22. Mask

Make: Aqualung
Model: Technisub - Favola
Colour: Black

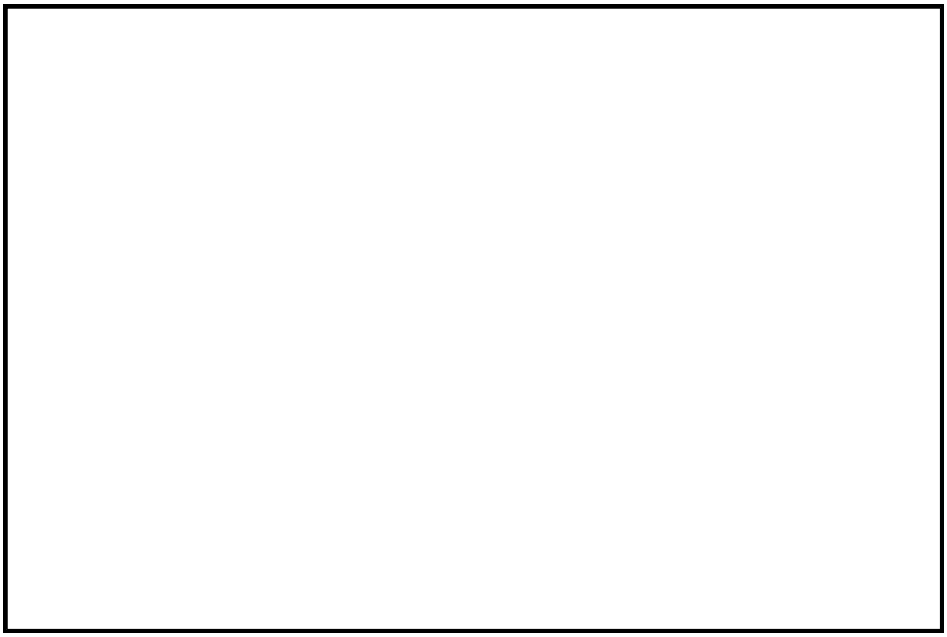


Photo 63: Mask

5.22.1. A mask is worn by a diver to allow vision in the water.

5.22.2. The mask was still in a good state of repair and when inspected no faults were found.

5.22.3. A subjective test found that it provided a seal against the face.

5.22.4. I do not believe the mask to be a contributing factor to the death of the Deceased.

5.23. Torch

Make: Hollis
Model: LED3
Colour: Black

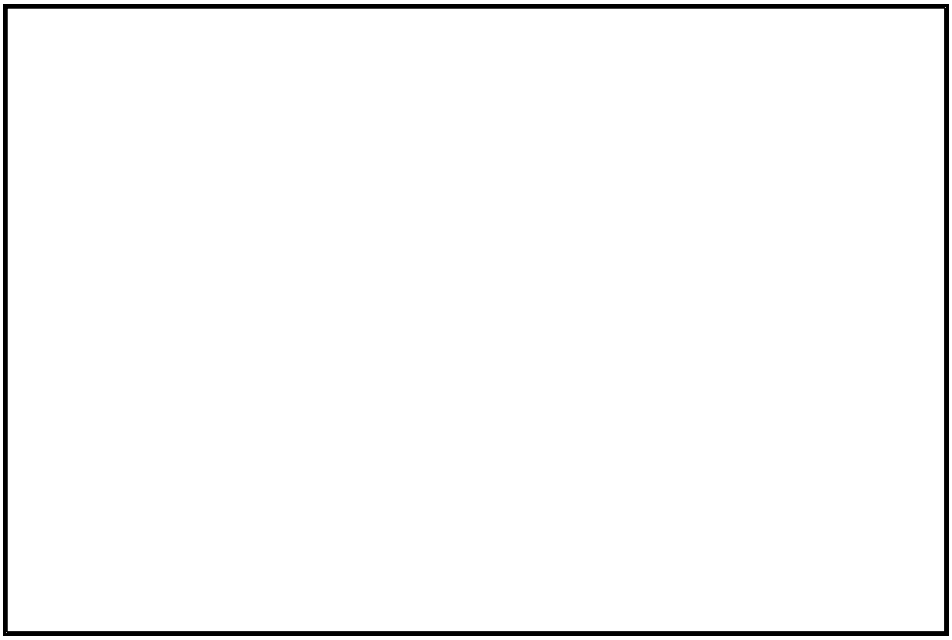


Photo 64: Dive Torch

5.23.1. A torch is worn/carried by a diver to aid in low light or where there is no light penetration in the water.

5.23.2. On the fatal dive, the Deceased was using the torch and it was attached to her BCD on the right hand shoulder strap.

5.23.3. According to Mr JEREMIAH, the torch the Deceased was using on the fatal dive was not activated when he found the Deceased on B Deck.

5.23.4. This differs from Mr TOA's statement, who advised me that both himself and Dr OSUNSADE stopped outside Euart's Door, and turned on their torches prior to entering the wreck of the SS President Coolidge.

5.23.5. When the Deceased was brought onto the shore, and after CPR had ceased, the Deceased's dive gear was checked by Mr GRANSBURY, and her torch was found to function correctly.

5.23.6. I have checked the torch the Deceased was using and it was found to operate.

5.23.7. In the position I received the torch in, testing showed that knocking the torch would not dislodge the battery contacts and the torch would remain operating. If however, the on/off switch had been loosened off, but short of removing the waterproof end cover, the batteries don't always make good contact and the dive torch if knocked can switch off.

5.23.8. I do not believe the torch to be a contributing factor to the death of the Deceased. But if it ceased working whilst diving in the darkness of the hull, this could cause panic and disorientation as there is no natural light on B Deck. This would especially be the case as it is believed at that time Dr OSUNSADE was alone and having gear issues, such as being over weighted, ill-fitting dive boots, ill-fitting fins and regulators that were not performing to an acceptable level. However, the dive torch takes effort to turn on, and it is unlikely to be knocked or bumped resulting in it turning off.

5.24. Online Customer feedback on Aquamarine (State of Equipment)

5.24.1. My observations at Aquamarines dive site on 8 March 2014 raise concerns over the servicing of equipment, and provide further corroboration for Mr BATCOCK's statement, as well as uncorroborated comments that can be found online from tripadvisor.
http://www.tripadvisor.co.nz/ShowUserReviews-g317046-d1954219-r117296595-Aquamarine_Dive_Center-Espiritu_Santo.html

5.24.2. The following comments have been inserted from the above link. It is important to note I have attempted to make contact with the writers of these comments but have not received any replies, so their authenticity cannot be verified. The current owners took over the company in 2010.

- User Name johny w, Sydney, Australia *"No longer safe" Reviewed 26 August 2011 "I had been diving with the old aquamarine they were very good and i was happy with my diving, i thought it would be the same and booked in with them again on my trip. Some of the dives i did the guide did not have a torch 40m+ in a wreck with no torch?? i was not happy with this and decided not to dive with them anymore. There were also time when the spare air tanks were empty and the gear they hired to other divers leaked and seemed very unsafe. i would advise people to stay away from this operation they are cowboys. and it seems the manager/owner does not know very much about diving he did not seem to care about his divers and was always on an important phone call... it is not long before something bad happens*"

- User Name Sunandfun97, Christchurch, New Zealand *“Standards have slipped dramatically....dangerous”. Reviewed 14 August 2011 My husband dives and had been with Aquamarine a few years ago and assumed it would be the same now so booked 8 dives with them before leaving NZ. Daughter and I met him on his "lunchbreak" each day and there were always tales to tell of shoddy undertakings by this very "cowboyish" organisation. From wornout gear, no buddy/gear checks, emergency tanks being completely empty, guides making the route up as they went, guides having to change over as they couldn't equalise, huge numbers of divers etc etc. Luckily my husband isn't too nervous but some people ended up pulling out despite having already paid. Their set up in town is the same building and that is fine but the change of ownership has not done it any favours. It’s a shame as they will lose business in the long run or, worse, cause a serious mishap so BEWARE and be careful. Diving attracts a lot of gunho people and a situation like this can take away any safety nets.If staying where we were at Aore Island there is a good guy there (malcolm, i think) who takes and brings you back to the Island. Seems like the best bet as we hadn't heard a lot of good stuff about Allan Power either.*”

- User Name Katie H, Sydney, Australia *“Advise Against Usage!”Reviewed 9 August 2011 2,000 vatu to hire a snorkel set, with a 5,000 vatu deposit needed, and one of the snorkel sets they lent us was broken! The mask only had one part of the strap attached, there was nothing to clip the snorkel to, and one of the snorkels was a dive snorkel when we asked for a normal snorkel so it kept letting in water. Also they weren't there at the appointed time we went to return our gear and tried to stiff us on giving back the deposit.”*

- User Name Madkeendiver. *“This company is not what it used to be, they are dangerous, be prepared to take care of yourself.”Reviewed 1 August 2011 via mobile I saw so many incidents that worried me I have written to PADI, SDI-TDI and SSI. Out of air ascents during deco dives were common, as were empty stage bottles and torches that didn't work. It is only a matter of time before these guys kill someone. The diving was spectacular, but I would go with one of the other companies next time. The manager is an arrogant man with an ego the size of a small planet.”*

- User Name Mckeeimages, Dhaka City, Bangladesh "*Old rundown, dirty and unprofessional!" Reviewed 20 July 2011 I have owned two dive operations and ran a few in the last ten years. So I guess I know what I'm talking about when I say this operation is unprofessional! The boy I talked to was not interested in us as divers but more in the $$$. It's time to move on mate when you give that impression to your customers. We dived for 5 days in Santo each doing 2-3 dives a day. Bang goes your commission! Gear was old, rundown just like the dive shop, if you could call it that, it's a barn with some photo's on the walls and a compressor running in the garden. Don't bother with these guys unless you are very inexperienced and then you won't know the difference."*

- Marie H, Busselton, Australia.*"Not worth the risk"* Reviewed 20 June 2014. *"I dived with this shop 5 times after I had literally just completed my Adv Open water and had a total of 10 dives logged. I would not recommend these guys unless you're very experienced and using your own gear. They'd told me that they're the cheapest dive shop in town and charge a little bit more than one other as the gear is all new. It did not look like new gear! What concerned me is that they don't make you dive with a computer. I lost my guide on 3 different occasions as he was moving too fast. The first time was when we were on the way to the wreck, and I waited for him for about a min with a separate dive group until he realised and came back. After this I think it's inexcusable that he then lost me another two times within the wreck. It was only the two of us diving, and with it being low season, most of the sites had no other divers. It shouldn't been too hard to keep track of one person! If I had of been separated from him for longer, how could I have safely surfaced without a computer? Wrecks at this depths can be disorientating and confusing, especially as a novice diver. If they are willing to take money from inexperienced divers, they need to take responsibility for basic safety. As a further point, there were no buddy checks and no-one checked my certification. At the time, in my naivety, I wasn't overly concerned by the behaviour of the shop or guide. It is after googling more information about Aquamarine and dive site that I appreciate how seriously dangerous diving the Coolidge can be. I want to stress that it's not worth going with the cheapest shop whenever your safety is at risk."*

- User Name Steph G, Adelaide, Australia. *“*Bring your own equipment!”*Reviewed 18 November 2012 I have thought long and hard about this review - because overall my personal experience with Aquamarine and Rehan has been very positive, and I hesitate to give a poor impression. He was very helpful, friendly and accommodating. We had a mixture of experienced wreck divers and one novice in our group and Rehan made sure that we all got to do the dives we wanted. His dive guides are among the best on Santo (Dave Tony has been with Aquamarine since the early days with Kevin & Mayumi Green) and know all the best dives and hidey-holes on the wreck, but - see my proviso later in this review. We were offered Nitrox, twins, etc (but we all dived on air with singles and did the Galley/Stern no probs - just ensure you have plenty of sling tanks and spares at the deco stops!) As other reviewers have noted, the bus was on time every morning and afternoon and the staff are friendly and good fun. Though I'm not sure how long the bus will hold together! HOWEVER - Rehan had quite a bit of equipment stolen, including wetsuits, BCs, regs, masks/fins, etc. This was a while ago, and doesn't really excuse the current condition of the gear. He also operates from his house now, rather than a dive shop and I don't know what facilities he has there, but the odd bit of equipment he provided was in very poor condition. The regs on the drop tanks breathed wet and the couple of times I needed to use one, the mouthpieces were very uninviting, having obviously not been thoroughly washed inside. I'm sceptical about how often the equipment is serviced professionally. Make sure you take a spare torch, because their torches are prone to failure and you may have to lend one to your dive guide! (We did a deep penetration dive from Galley to Anchor Locker with me and my buddy providing all the light and computer info, due to our guide's equipment failure!) Our one novice diver had her own dive guide, which was great - but these very experienced guys tend to get a bit blasé and "do their own thing", expecting their tourists to keep up with them. Our girl chewed through her air and, when she was needing a sling tank, her guide was too far ahead to reach and wasn't checking on her - she ended up having to buddy breathe with her husband back to the deco stop, which was stressful for both of them. On another occasion, an experienced diver returning from a deep dive against strong current had the same thing happen, she was struggling and I had to race to catch up with our guide to point this out.*
  Bottom line is: if you're an experienced diver with all your own gear, I would recommend Aquamarine without hesitation, for a relaxed and enjoyable dive trip, with knowledgeable guides and friendly, helpful service. If you're a novice, or need to hire gear, go with Allan Power (grumpy as he is, he still runs a professional operation!)”

5.24.3. In September 2014, I received an email from Constable Wayne DICKSON who frequently travels to Vanuatu for work purposes. Constable DICKSON arrived in Vanuatu several weeks after my trip and spoke to Miss CHAMBERLAIN regarding another incident which had occurred just after my departure from Santo, Vanuatu.

5.24.4. Miss CHAMBERLAIN stated that in March/April 2014 she was diving on the SS President Coolidge and observed Mr TOA by himself. Miss CHAMBERLAIN signalled to Mr TOA as to the whereabouts of his customer, and Mr TOA indicated back that he did not know. Miss CHAMBERLAIN indicated to Mr TOA he needed to go back and find his customer, which it is believed he did.

Comment:

5.24.5. I believe the incident that Miss CHAMBERLAIN observed is linked to the comment I found on Tripadviser from Marie H from Australia.

Given the comment made by Marie H, and from Mr AULD's observations of seeing a lone diver moving quickly towards the stern at the end of his dive, I believe Mr AULD has confused the order of divers and the timings within his dive, and has in fact seen Dr OSUNSADE swimming quickly trying to keep up with her dive guide Mr TOA during the early stages in his dive, such as when Mr AULD was trying to equalise due to his sinus block.

Mr AULD took at least ten minutes at the end of his dive to address his nose bleed, and by his own accounts, that incapacitated him for this time.

6. TIDE / CONDITIONS

6.1 The conditions at the time of the dive were good. Mrs Andrea MATTIAZZI commented:

- *“No surge”.*
- *“Clear sky”.*
- *“No swell”.*
- *“Calm water”.*

6.2 The depth of the dive site varies and the visibility was reported to be up to 15 – 20 metres outside the wreck.

6.3 The water temperature at the maximum depth dived to by Dr OSUNSADE has been recorded on her dive computer to be 28 degrees.

6.4 Inside the wreck, the visibility is dependent on natural light penetrating openings or through skylights/portholes. If other divers have been through the same area, the water will be silty and visibility will be reduced as the particles in the water will refract the light from the dive torch.

6.5 Once Dr OSUNSADE was away from Euart's Door, there is no natural light, and visibility is reduced to the dive torches light output, as well as sediment/silt in the water.

6.6 When I spoke to Mr JEREMIAH about diving in the vicinity of 'The Lady', he stated:

6.7 *"we allow a good time for others come through... because of silt. If we did not allow this time, when we come past 'The Lady' it would be silty for the next group".*

6.8 When Dr OSUNSADE was inside the wreck on B Deck with no natural light, potentially with her dive torch turned off (as reported by Mr JEREMIAH), silt stirred up from both herself and Mr TOA, the loss of her fins, a poor performing regulator, and being alone without her dive guide Mr TOA; these conditions are cause for concern for me and would create the onset of panic in experienced divers.

Comment:

6.9 Good diving practice using guidelines from either recreational or technical diving manuals would normally suggest the use of a wreck diving reel. The purpose of a wreck diving reel is to provide a safe means of penetrating a wreck in the event of becoming disorientated, or in the event of a loss of visibility. In either of these situations, the diver can rely on the reel and line to work their way back to their entry point.

In the context of wreck diving on the SS President Coolidge most of the dives do not split up excessively until deeper dives, such as past 'The Lady' and the dive groups are small enough to manage. More importantly, it is not feasible or manageable to have multiple dive operators running reel lines through the wreck, when a number of groups could and will be going to the same location on the same day.

Should dive operators be made to use wreck reels whenever they are completing penetration dives, there is added risk of entanglement for divers who have never used these devices, and delays in untangling these lines on the ascent. This would lead to an increase in divers running low on, or out of, air during the dives and is simply not a practical means of diving.

A solution would be for dive operators to work together and dive at different times, but with short daylight hours and increases in the number of dive operators in Espiritu Santo and the surrounding islands, it is not practical to do this, especially during the peak periods when dive operators are booked up with tourists diving the SS President Coolidge.

In areas where there is risk of visibility reducing, wreck reels should be used. However, on a dive to 'The Lady' this would not be a recommended, due to minimal silting and the ease of access back to Euart's Door.

6.10 The conditions during this dive were good and should not be a contributing factor in this death even given the Deceased's limited experience as she was on a one-on-one guided dive.

7. HEALTH / MEDICAL

7.1 Currently in New Zealand a recreational diver must complete a medical assessment prior to commencing training.

7.2 Therefore it is assumed the Deceased was in good health to obtain clearance to dive for her PADI Open Water Course in August 2004.

7.3 Enquiries I made with the Deceased's husband, Mr Damien HEALY, have obtained the following information regarding the Deceased's medical history and recreational activities she partook in.

7.4 *"I have known Laila Osunsade since 2005, and to my knowledge Laila had no medical problems and was in good health".*

7.5 *"Because Laila was a doctor, she never had a GP during that period".*

7.6 *"Her main hobby was scuba diving, but she was also a keen swimmer and loved to swim. During my time with her in water she was a superb and confident swimmer".*

7.7 *"She was a member of two sport health clubs, they were Anytime Fitness and Olympic Pools and Fitness Centre in Auckland".*

7.8 The Deceased was 173 cm tall, 120 Kg in weight, her BMI was 40 and she was a heavy smoker. Dr OSUNSADE would be classified as obese.

7.9 I do not believe her fitness to be a contributing factor in this death. But given Dr OSUNSADE's BMI and being a heavy smoker, I believe these two factors could have the potential to be a contributing factor in her death.

8. DIVING HISTORY

8.1. Enquiries with the Deceased's husband and with diving training agencies show the Deceased was a qualified diver, who had completed 42 dives prior to the fatal dive.

8.2. PADI advised PNDS the Deceased had completed the following dive courses:

- *PADI Open Water Course, Dive Seychelles-Underwater Centre (Seychelles), 13 August 2004*
- *PADI Advanced Open Water Course, Sinai, 8 July 2006*
- *PADI Enriched Air Course, Cook Islands, 15 April 2010*
- *PADI Rescue Diver Course, Vanuatu, 5 August 2010*
- *PADI Deep Diver Specialty Course, Thailand, 25 November 2011*
- *PADI Peak Performance Buoyancy Specialty Course, 26 November 2011*
- *PADI Digital Photographer Specialty Course, Thailand, 26 November 2011*
- *PADI Diver Propulsion Vehicle Specialty Course, Thailand, 27 November 2011*

8.3. Although the Deceased has completed a good number of dive courses, which build on skills learnt from the Open Water Course, these courses are under close supervision and don't make a person an experienced diver.

8.4. Experience comes from diving in varying dive sites over time, in different conditions and learning from each dive.

8.5. Given the Deceased had completed 42 dives prior to the fatal dive; over half of her dives had been on courses, over almost nine years, I determine the Deceased to be an inexperienced diver but a capable diver equipped with sufficient skills to have completed recreational diving, given the training she had received to date.

8.6. However, without any of the information above, Aquamarine have failed to detect what I believe to be early warning signs of the Deceased's ability to complete deep, technical dives on the SS President Coolidge. These include:

- Buoyancy control issues due to being over weighted
- Rapid breathing rate which lead to out of air scenario's due to being over weighted and being issued ill-fitting dive gear (dive boots and fins)
- Her lack of dive experience, especially relating to deep dives and wreck penetration
- Feedback from other divers who complained about a dive being cut short due to the Deceased running low on air

8.7. According to the Deceased's logbook, the following day's dives were completed, and the cylinder contents were recorded as follows:

- 29 April 2013, Start 200 {Sic. Bar}, End 20 {sic. Bar}

8.8. At the completion of diving on the first day the Deceased dived with Aquamarine, there were clear indications based on her cylinder contents remaining that the Deceased was struggling with the depths and bottom times on the SS President Coolidge.

8.9. According to Mr SYED, a staff meeting occurred at the end of the each day. The purpose of this meeting was to discuss how the dives went and any issues found during the day's activities.

8.10. If this meeting did occur on Monday 29 April 2013, the Deceased's raised air consumption and buoyancy control was either missed or discounted.

8.11. On Tuesday 30 April 2013, the Deceased dived with Aquamarine again. The Deceased's logbook entries show the following:

- 30 April 2013, Start 200 {Sic. Bar}, End 10 {sic. Bar}

8.12. The cylinder contents starting pressure differs from Mr TOA's account, who told me she had 250 Bar.

Comment:

8.13. Most training agencies will recommend divers end their dive with 50 Bar cylinder contents remaining on the surface.

It is an unsafe practice to take divers on deep dives without contingency plans, such as spare air cylinders, and for divers to end a dive with only 10 Bar cylinder contents remaining.

Technical divers will generally use the principle of one third in, one third out and one third spare. This provides a safety margin for a number of scenarios such as increased breathing rates, loss of air scenario's and/or simple errors such as slow ascents, or working against currents which will increase a divers breathing rate, which affects cylinder contents remaining.

8.14. On Tuesday 30 April 2013 during the morning dive to the Cargo Holds 1 and 2 the Deceased has run low on, or out of, air on the decompression stops and was given another dive cylinder to breathe from so she could complete her mandatory decompression stops.

8.15. This was the second warning Aquamarine guides should have seen that the Deceased was struggling with the ill-fitting dive gear, being over weighted and the depths. As Aquamarine did not provide me with any hire record information, I am unable to verify if Dr OSUNSADE was using the same regulator set as that on the fatal dive.

8.16. The other warning sign during this dive was the Deceased's rapid breathing cycles and fining technique/action (shown by video footage), which were far in excess of a normal diver and should not be missed by a dive guide, which are all indications of the above mentioned issues with her gear and being over weighted.

8.17. That afternoon, the Deceased completed a shallower dive at Million Dollar point. The Deceased's logbook entries show the following:

- 30 April 2013, Start 200 {Sic. Bar}, End 20 {sic. Bar}

8.18. In the morning of Wednesday 1 May 2013, the Deceased was allowed to dive to 'The Lady', which is a deeper dive that involves a wreck penetration. The Deceased's logbook entries show the following:

- 1 May 2013, Start 210 {sic. Bar}, End 20 {sic. Bar}

8.19. That same day, the Deceased was allowed to dive to the 'Medical Supplies'. No cylinder contents were recorded in her logbook.

8.20. I have concerns that Mr SYED's alleged staff meetings actually occurred, and the days diving was debriefed, as the concerns around the Deceased's ability to dive at these depths should have been highlighted.

8.21. Any prudent dive company would complete pre and post dive buoyancy checks, and make sure dive equipment is the correct size, especially if any warning signs are present during a dive. Aquamarine should have met with Dr OSUNSADE to discuss alternative dives and should not have put the Deceased into deeper dives, or dives that required penetration into any wreck given the depth involved and her breathing rate.

8.22. I do not believe it is an acceptable practice to manage the above risk by pairing the Deceased up one on one with a dive guide and expect her to complete the dive to 'The Lady', which is 42 metres deep, without the expectation she will require a backup air source.

8.23. Aquamarine dive guides, for all deep dives, carry an additional dive cylinder in the event a diver runs low on air. I believe it has become the norm for the dive guide to expect divers to use this backup air source as an acceptable practice.

8.24. I believe this death has occurred within the wreck of the SS President Coolidge on B Deck, with 100 Bar remaining in the Deceased's dive cylinder, and running out of air is not a factor in this death.

8.25. What is concerning to me is that the Deceased was being taken on a technical dive with limited air supply, a poorly functioning regulator and a high breathing rate due to being over weighted.

8.26. I believe there was insufficient planning and contingencies in the event the dive guide or the diver had equipment malfunction, to simply rely on both divers being able to reach the surface safely, especially if an incident occurred near the end of the dive, whilst at depth.

8.27. I believe her lack of experience to be a contributing factor to the death of Dr OSUNSADE and, had the warning signs been identified, it is highly probable Dr OSUNSADE would be alive today.

9. OXYGEN EQUIPMENT

9.1. According to Dr STAKER, on the first day of diving, the owner of Aquamarine stated that he had an emergency tank of oxygen in the van in case it was required.

9.2. On the day of the incident, Dr STAKER remained on the beach whilst the two dive guides completed another dive to search for Dr OSUNSADE, and the tourists completed a surface search using mask and snorkel.

9.3. During this time, Dr STAKER requested Mr SYED to gather all medical equipment he had available, including the oxygen cylinder.

9.4. According to Dr STAKER, Mr SYED replied: *"we should wait for the ambulance to arrive".*

9.5. Dr STAKER repeated her request to Mr SYED who retrieved a small plastic box containing an old facemask and attachments for an oxygen cylinder. There was no self-inflating bag and no oxygen cylinder.

9.6. According to witness statements, the only oxygen brought to the scene was by the paramedic, Mr ELLABY, who had learnt of the incident second hand. As already stated, Mr ELLABY went to Mr SYED's address to uplift the oxygen cylinder.

9.7. In the event of a non-breathing diver, a resuscitation bag is required to assist pumping oxygen into the lungs of the patient. Without a bag mask, the oxygen is wasted, and cannot effectively be administered during CPR.

9.8. On Saturday 8 March 2014, I went to Aquamarine's dive site and inspected the oxygen equipment with the permission of Mr Freddy WOLEG. What I observed was unacceptable, and raises serious concerns over the management of Aquamarine, and the potential risks for divers.

9.9. I asked Mr WOLEG to show me the oxygen cylinder. Mr WOLOG located a dive cylinder on the trailer (as shown in pictures 64 & 65), allegedly filled with oxygen. The dive cylinder had no industry standard oxygen cylinder markings/warning labels on it. However, divers using Aquamarines hire regulators would not be able to use the oxygen filled dive cylinder, as it had an incompatible DIN valve attachment for the regulators that they were using.

9.10. Standards in New Zealand require all oxygen cylinders to be marked with the appropriate labels, clearing showing what the cylinder contents are comprised of.

9.11. Without these warning labels showing the gas type and blend, there is risk of the oxygen becoming toxic even at shallow depths, resulting in convulsions followed by drowning.

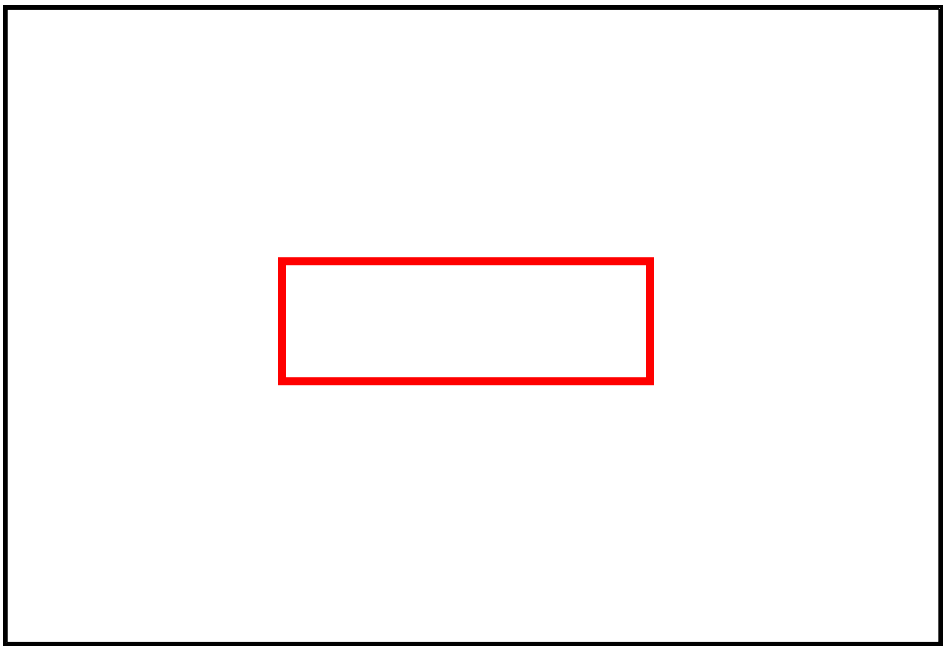


Photo 65: Unlabelled dive cylinder filled with oxygen

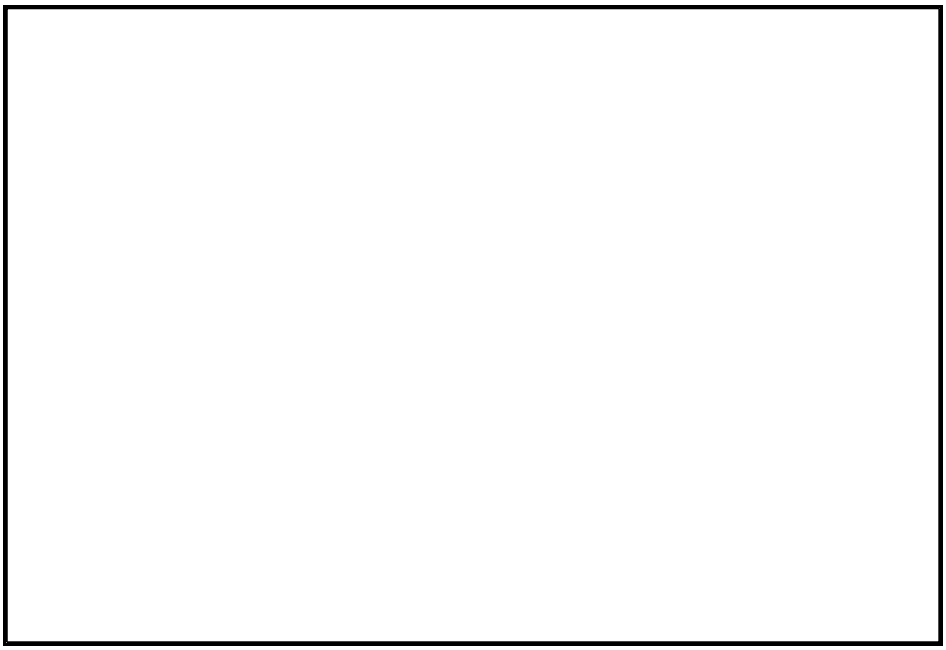


Photo 66: Close up of unlabelled dive cylinder filled with oxygen

9.12. Also, had a diver brought with them to Vanuatu a compatible DIN first stage regulator and had selected the oxygen dive cylinder (assuming it was of medical grade oxygen), they would put themselves at risk due to toxic oxygen levels at depths beyond 10 metres. The elevated oxygen partial pressures results in the onset of convulsions and ultimately could result in someone drowning.

9.13. Had the oxygen been required in a diving emergency, no-one would know what it was, as it is not clearly identifiable as an oxygen cylinder, nor does it identify the grade of oxygen (medical grade or substitution i.e. not intended for use by humans - used for welding etc).

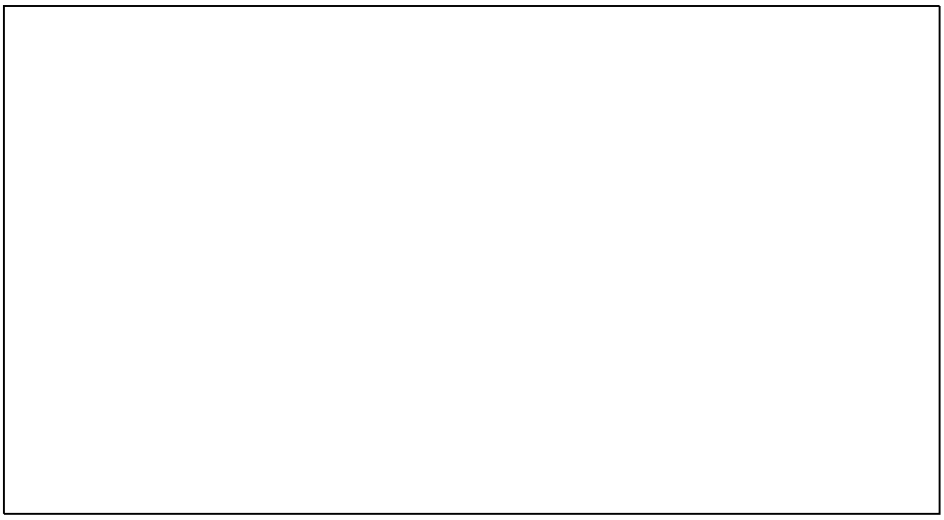


Photo 67: K Valve (left), DIN Valve (right)

Note: These valves are not intended to supply medical oxygen and flow rates cannot be adjusted.

Image downloaded from: http://www.atomicaquatics.com/first_stage_design.html on 25 June 2014
Image above shows the difference between yoke first stage regulator (left) and DIN first stage regulators (right)

9.14. The correct labelling on a dive cylinder filled with enriched air is shown below, which is an international guideline.

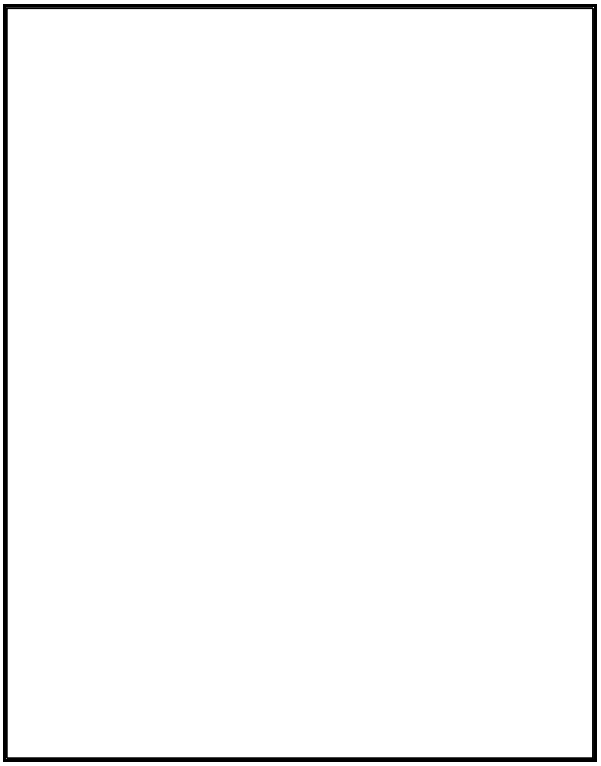


Photo 68: Example of a correctly marking enriched air dive cylinder

Image downloaded from: http://www.scubadiving.com/training/basic-skills/practical-guide-nitrox on 25 June 2014.

9.15. The correct labelling in New Zealand on a dive cylinder filled with oxygen is shown below.

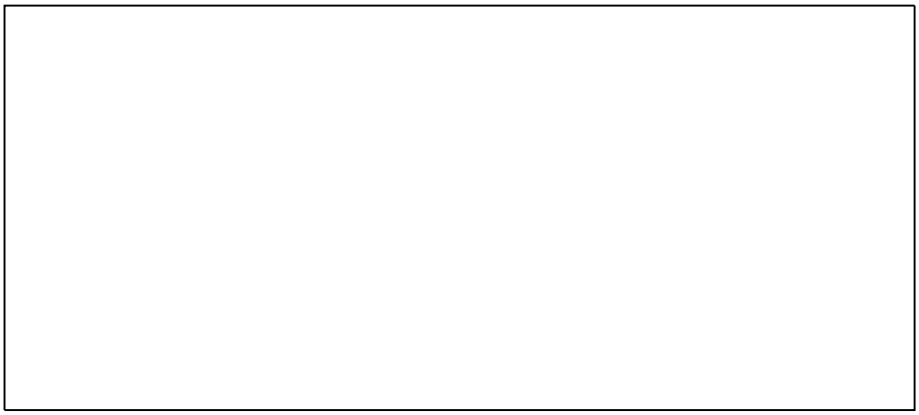


Image downloaded from: http://www.boc-gas.co.nz/en/sheq/cylinder-information/index.html on 30 June 2014.

9.16. Mr SYED is aware of the requirement to label his dive cylinders. In Aquamarines storage room, I observed two G size cylinders labelled correctly.

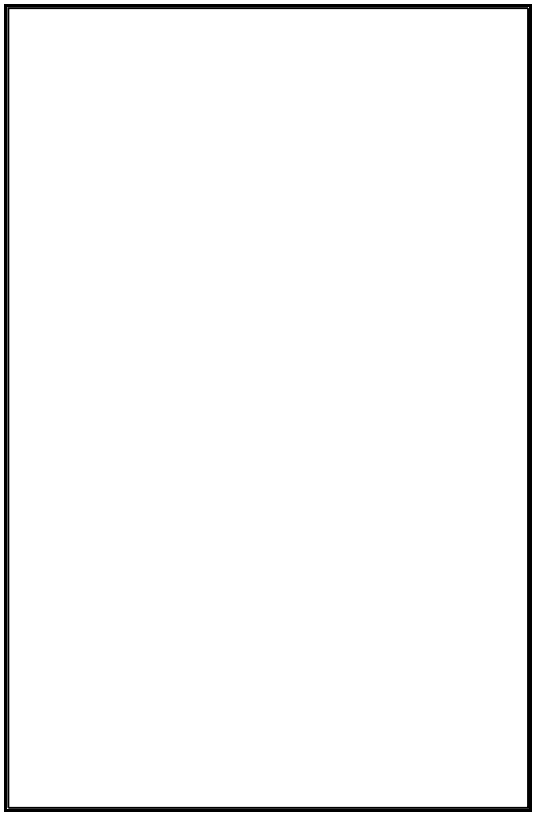


Photo 69: Oxygen G Cylinders labelled correctly at Aquamarine

9.17. During this visit to Aquamarines dive site, the remainder of the oxygen equipment was found to be in a green pelican box, but on close inspection was was found to be in a poor state, with the system unassembled and hoses kinked or crushed.

9.18. There was still no bag mask assembly present in the Aquamarine oxygen equipment. Therefore the systems available only catered for a conscious breathing patient.

9.19. When PNDS requested to view the medical kit, this was found to be missing. The dive guide who remained on the surface, Mr Freddy WOOLONG, claimed the first aid kit was at Mr SYED's house.

Comment:

9.20. It is ideal to have a clearly defined first aid kit and oxygen kit, which is in a good state, which caters for both conscious and non-breathing divers.

Also, all participants, guides and customers should know where the oxygen kit is located, and how to use it in the event of a diving incident.

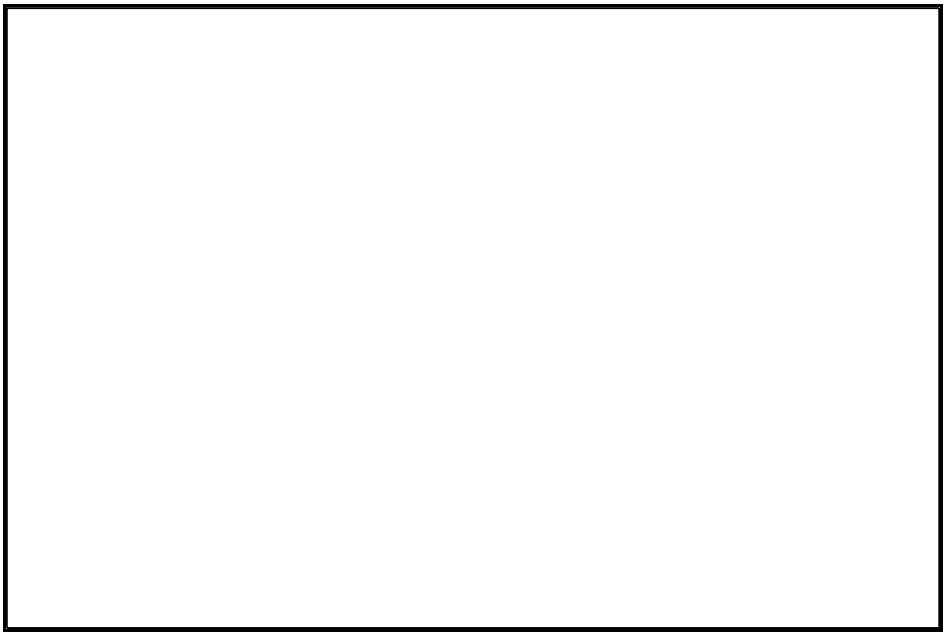


Photo 70: Oxygen kit disassembled with a rescue breathing mask for CPR

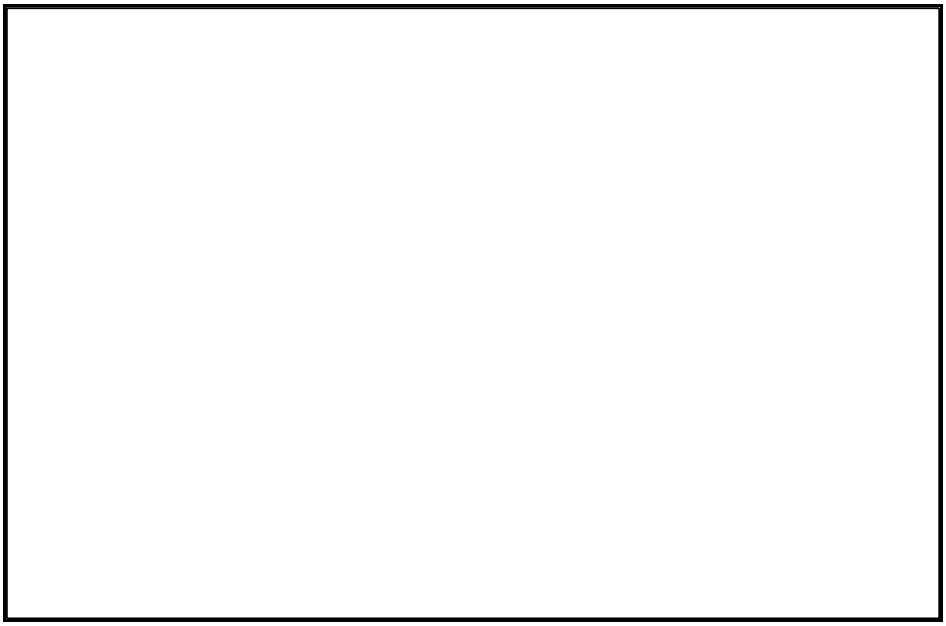


Photo 71: Oxygen demand regulator for use with face mask on breathing patient

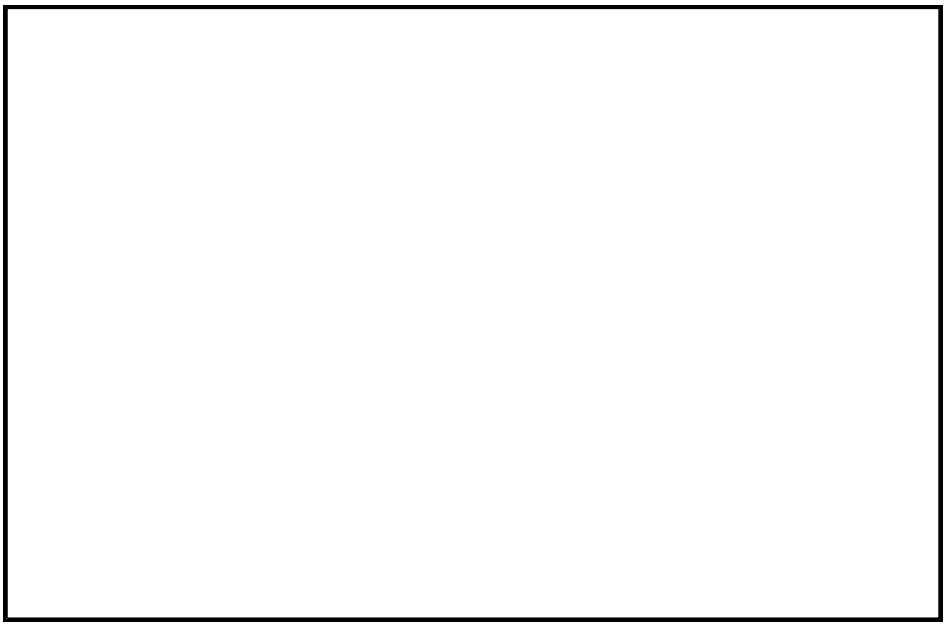


Photo 72: Face mask to be used on conscious diver with oxygen demand valve

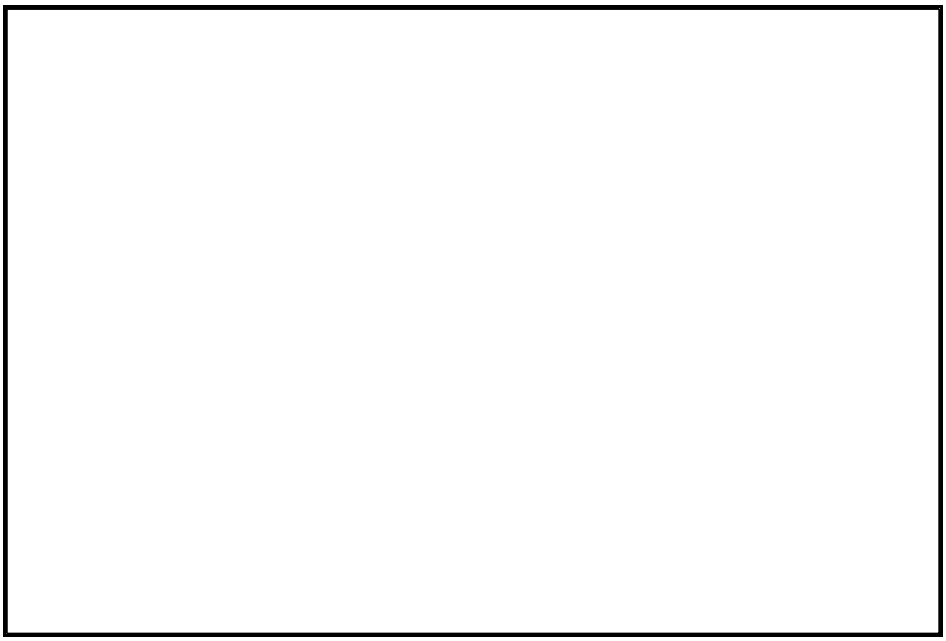


Photo 73: Oxygen mask with bag used on conscious divers

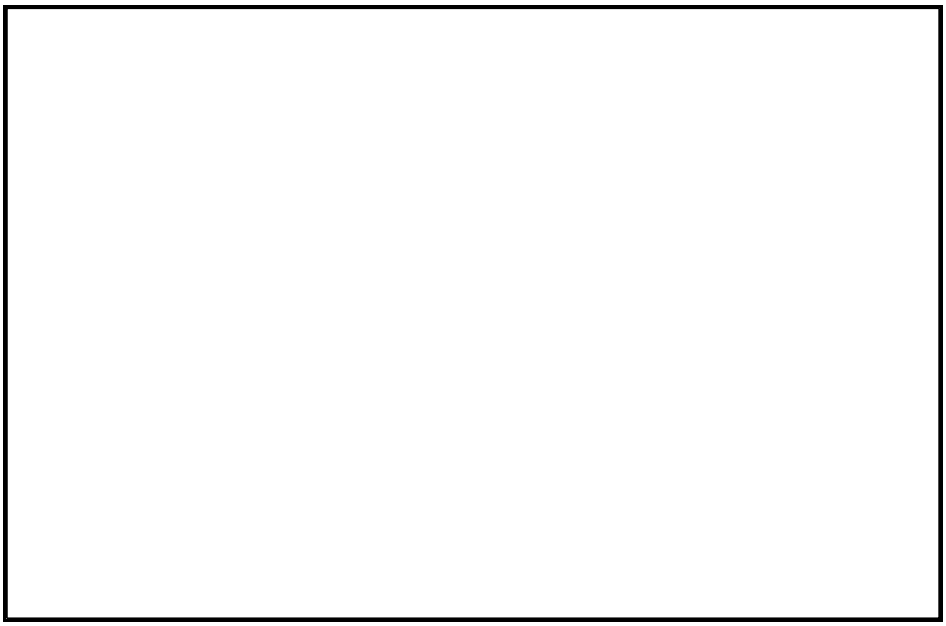


Photo 74: Rescue mask

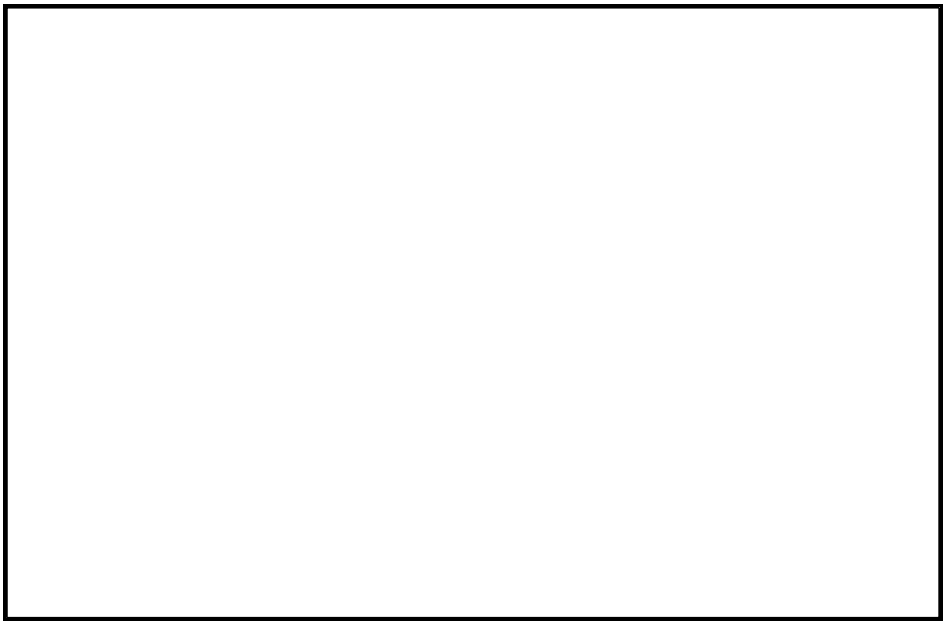


Photo 75: Oxygen line with several kinks in the hoses.

10. DIVE PROFILES

10.1. During the course of the investigation when I was in Vanuatu, the unsafe practice of short surface intervals was observed.

10.2. Short surface intervals for shallow dives may be acceptable depending on depth and bottom time and the duration and depth of the next dive, if they are planned by divers using tables and or computers.

10.3. However, in the case of deep diving on the SS President Coolidge, these dives are by their nature technical deep dives, and must be thoroughly planned and, more importantly, the dive plan must be strictly followed.

10.4. During one interview with me, the diver knew the maximum bottom depth, but exceeded it on the dive to the SS President Coolidge.

10.5. The dive guide was apparently unaware of the breach in depth, and according to the witness, the group completed the decompression stops as briefed.

10.6. An hour and 17 minutes later, that same group completed a second dive, this time at Million Dollar Point. Pictured below is the dive guides dive watch.

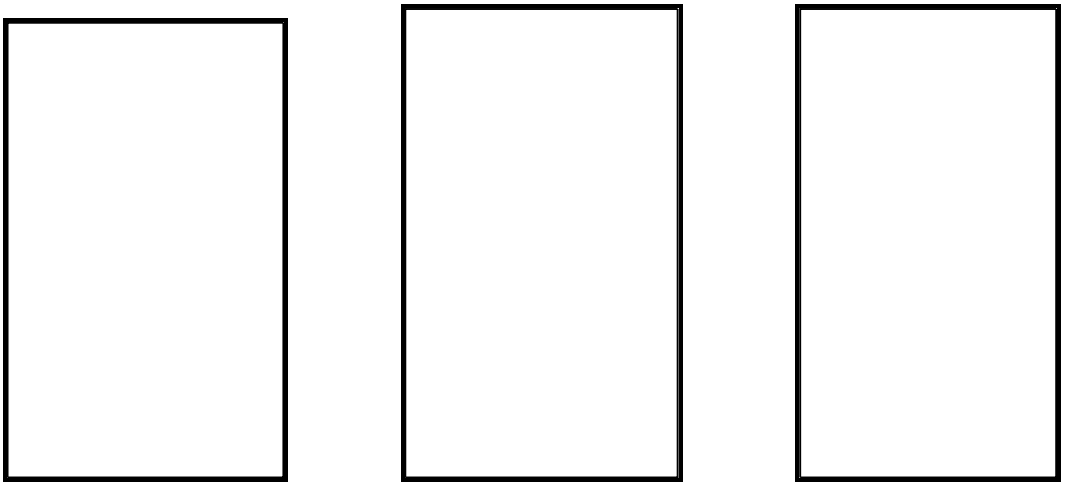


Photo 76: Dive guides dive watch showing unsafe surface interval

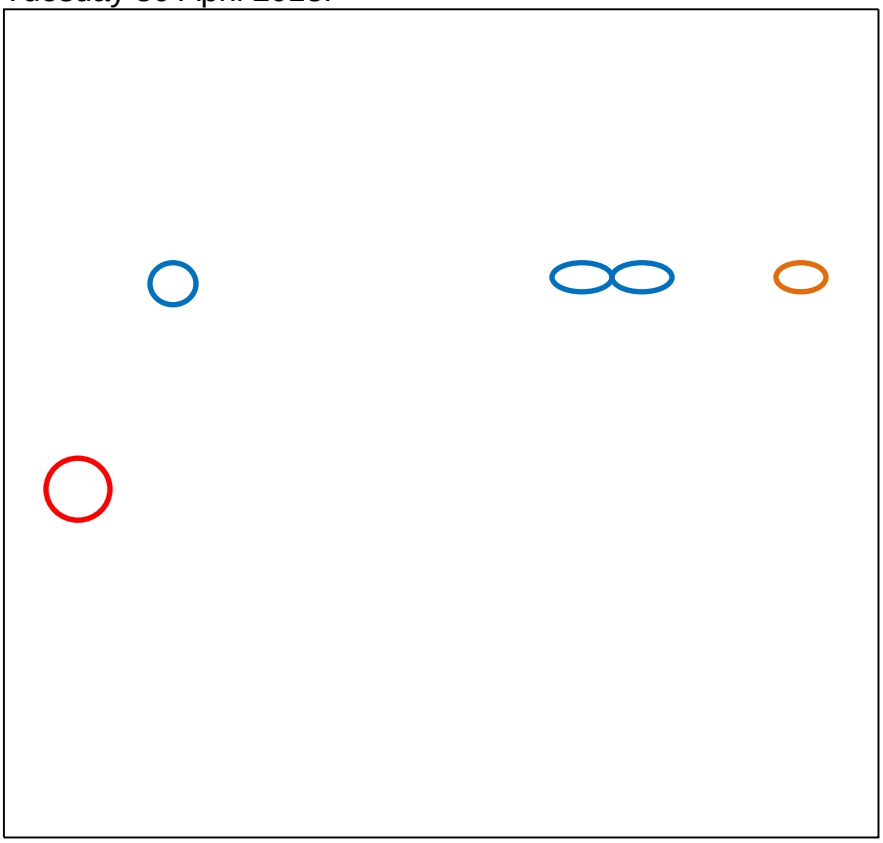
Dive One - Depth 30.5m Surface interval 1 hr 17 min Dive Two – Depth 28.4m

10.7. When Dr OSUNSADE completed her dives with Aquamarine she also exceeded safe dive practice by having short surface intervals between dives. But I do not believe that having a short interval between dives of one hour 18 minutes has contributed to her death.

10.8. However, this shows lack of safe practice. This breaches recreational dive tables, places divers at risk of decompression illness, and shows that divers are not questioning the dive guides around safe diving practices. It also shows a lack of due care by Aquamarine management by ensuring tables are followed and shows that Aquamarine staff are not questioning unsafe dive practices.

10.9. Dr OSUNSADE's first dive was to 33.1 metres, followed by another dive to 31.2 metres 78 minutes later.

10.10. The following is an illustration of the dives Dr OSUNSADE completed on Tuesday 30 April 2013.

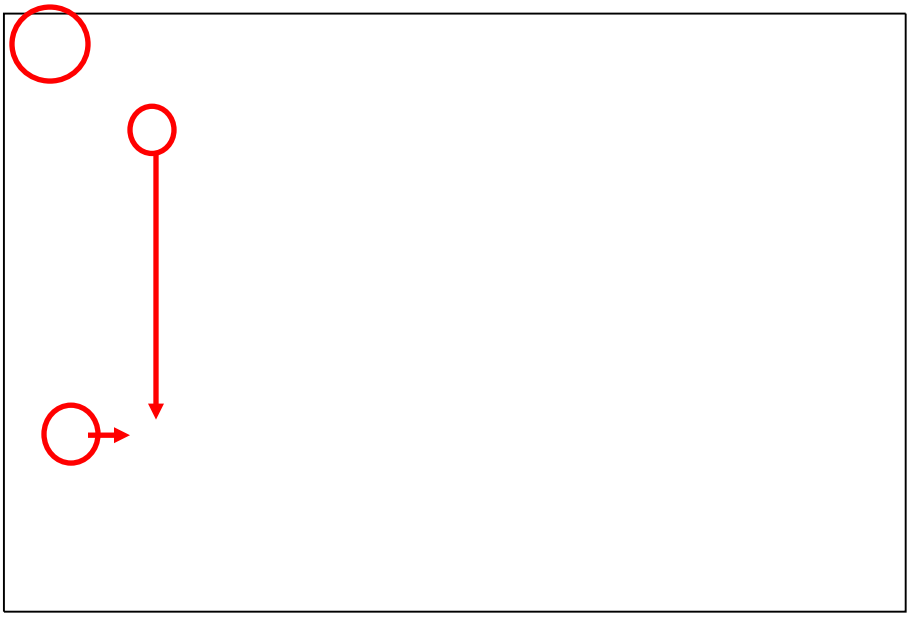


33.1 metres, rounded up to 36 metres.
Bottom time = 17 minutes, rounded up to 20 minutes.
Decompression stops required = five min at six metres, 10 minutes at three metres.

10.11. Dr OSUNSADE ended that dive with a repetitive factor of 'F'.

10.12. To safely dive to 31.2 metres for 14 minutes, Dr OSUNSADE should have had between 15 and 18 hours surface interval.

10.13. To work this out, refer to Table B below, go down to 33 metres (depth of second dive was 31.2 metres) and following line across to find the bottom time of 14 minutes. The longest a diver can do at 33 metres is 10 minutes, after obtaining a repetitive factor of 1.1.

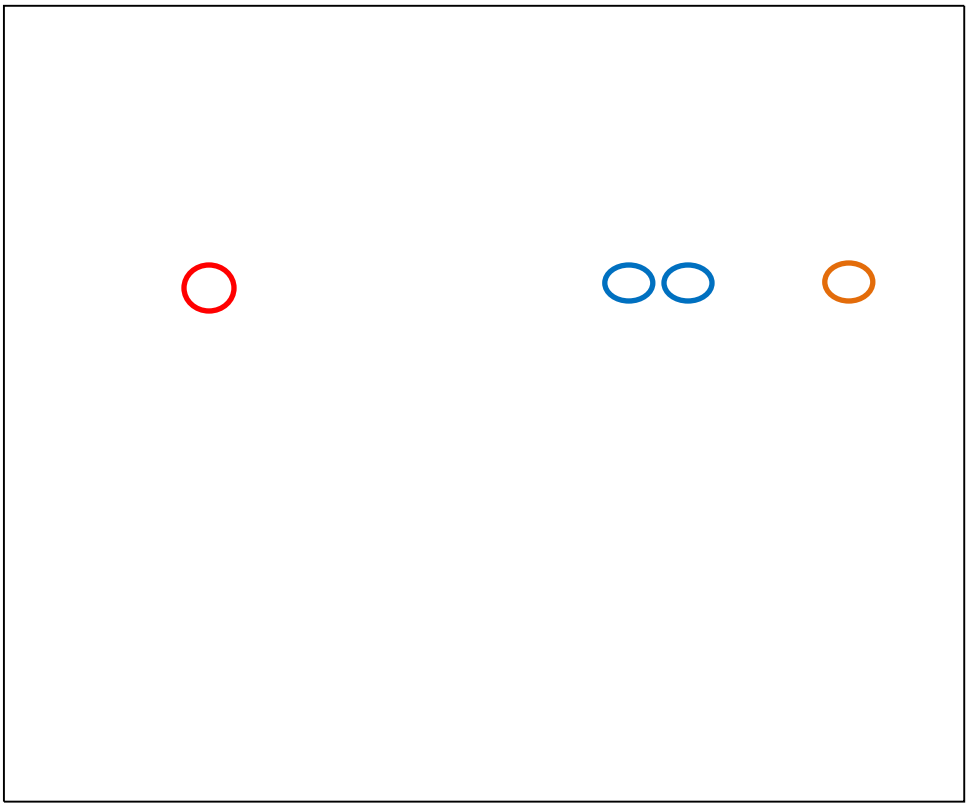


10.14. Given that Dr OSUNSADE has only had an hour 18 minutes surface interval, then dived to 31.2 metres for 14 minutes, we can work out her repetitive dive factor as follows:

10.15. On Table A, using Dr OSUNSADE's previous repetitive factor of 'F', follow the line across until Dr OSUNSADE's surface interval falls between the two times shown in the column above., 1 - 1.29 hours surface interval = RF 1.6.

10.16. Using the repetitive factor of 1.6, we must multiply Dr OSUNSADE's actual bottom time on the second dive by 1.6, which equates to 14 x 1.6 = 22.4 minutes effective bottom time.

10.17. We take the depth of Dr OSUNSADE's second dive of 31.2 metres and insert this into the table below. We then look for a time greater than Dr OSUNSADE's adjusted bottom time (22.4 minutes, which is rounded up to 25 minutes on the table below), in order to work out the decompression stops required, and her repetitive factor at the end of that dive.



10.18. At the end of the second dive on Tuesday 30 April 2013, Dr OSUNSADE should have completed two decompression stops, one at six metres for six minutes, the second at three metres for ten minutes.

10.19. Looking at Dr OSUNSADE's dive profile at the end of her dive on Tuesday 30 April 2013, the profile is erratic with varying depths, and breaching of decompression stops. Refer to Figure 6.

10.20. Decompression stops sometimes referred to as ‘off gassing’ must be completed to allow inert gas absorbed by the body i.e. nitrogen to be expelled in a controlled manor otherwise bubbles can form in the blood and body tissues leading to diving illnesses or even death.

10.21. Dr OSUNSADE has not completed the necessary time in water decompressing. However, as shown in this case a diver seldom completes a square profile as indicated by the tables above and that for only a short period of time Dr OSUNSADE was at the depth of 31.2 metres, with her average depth being only 15.4 metres during the dive. This is why she has not suffered a decompression illness.

Comment:

10.22. This is a very unsafe practice being conducted by Aquamarine and Dr OSUNSADE.

Dr OSUNSADE should also have known this, and is relying on her dive computer without completing any checks using dive tables or checks on her dive computer.

Had she checked either her PADI dive tables or the planning mode in her dive computer, she would have noted she was unable to complete the second dive without an appropriate surface interval.

Aquamarine are also not watching their divers closely enough, as one diver I spoke to in March 2014 exceeded this maximum depth during the dive on the SS President Coolidge, and I believe the dive guides were oblivious to that breach.

These breaches in depth easily occur when diving in large groups, on such a large wreck, but should be managed by the dive guides, with strict protocols being set in place.

A simple solution to this would be for dive guides to record the maximum depths of each diver after the dive, and work out whether the diver can dive again.

Had Aquamarine recorded the depths and bottom times on 30 April 2013, Dr OSUNSADE after a four hour surface interval, would have been allowed to dive at Million Dollar Point at a depth of 21 metres for 21 minutes, 24 metres for 16 minutes or 27 metres for 12 minutes.

However, divers should not attempt to take their depth and time limits to the maximum of the dive tables. They should start their ascent several minutes short of the tables recommended maximum time and depths, in order to maximise safety.

10.23. Where breaches occur such as exceeding maximum depths and omitting decompression stops those divers should not be diving for 48 hours. Should this occur, divers may in some instances need to delay their travel plans should they be departing the island by air.

10.24. Aquamarine only give their divers 24 hours to ‘off gas’, prior to them flying back to Port Vila.

10.25. This is an extremely dangerous scenario. Divers should, if completing decompression diving, be given 48 hours to ‘off gas’ prior to flying in order to ensure there is no residual nitrogen remaining within their system. This will prevent diving illnesses (bends).

10.26. Also uncovered during this investigation are the extreme depths that divers are being taken to on air. In one such example, Dr STAKER was guided by Aquamarine to 64.6 metres on the SS President Coolidge. Interestingly, Aquamarines dive decompression stop chart only caters for dives to 63 metres.

10.27. In the case of Dr STAKER, she is a novice diver with no technical diving experience. From a technical diving viewpoint, this was an unplanned dive, without any assessment of air management given breathing rates and without contingency air. Also of concern is that Dr STAKER completed this dive on a single dive cylinder. An out of air scenario at depth could easily lead to further issues arising, even with the dive guide carrying one spare dive cylinder with them.

10.28. That evening, Dr STAKER completed a night dive to a depth of 30.2 metres.

10.29. This information only came to light in June 2014 during routine questioning with the divers who were diving with Mr John GRANSBURY’s group.

11. DIVE BRIEFINGS

11.1. During the course of the investigation when I was in Vanuatu, two dive briefings were observed.

11.2. I was only present for part of the dive briefings at the dive sites. However, I was able to confirm through speaking with the divers, no mention was made to:

- Oxygen cylinder
- First aid kit
- Emergency procedures
- Emergency diver recall systems

11.3. Aquamarine as good practice leaves a staff member with the vehicle. When the staff member was asked to locate the medical kit and oxygen kit, that person had to hunt in the vehicle to find the oxygen kit.

11.4. I also saw that Aquamarine staff do not appear to have a checklist to ensure they have checked that safety related gear has been loaded into the vehicle. As a result, when spoken to by me, the Aquamarine staff member (Mr WOLEG) found he was missing his first aid kit.

11.5. No witness from Mr John GRANSBURY's dive group that PNDS contacted can recall what they were to do in the event they became separated from the group. Instead, Mr John GRANSBURY went through separation drills after the dive guides briefing, and covered off further points, including what to do if separated.

11.6. This raises concerns by me. A good dive briefing should be thorough and cover all relevant points.

11.7. On Thursday 2 May 2013, Aquamarine had no emergency recall system. Mr TOA and Mr SYED had to wait until staff returned to the surface, rather than having the ability to recall them earlier in the dive.

11.8. Given the depth of the dive, a safety recall system may not have been a benefit in the case of Dr OSUNSADE; but having a system available allows a dive site to be managed in the event of a diving incident, whereby all divers are required to be recalled to the surface. A lack of such protocols, processes and equipment may not be a factor in the death, but it is an indicator of general practice and shortcomings.

12. POSTMORTEM

12.1. The Post Mortem was completed 11 days after death by Dr. Joanna GLENGARRY.

12.2. The following are the principle pathological findings:

- Moderate Decomposition
    - Bloating and gaseous distension
    - Marbling
    - Skin and organ distension
    - Mild to moderate decomposition of organ
- Blunt Force Injuries
    - Bruise dorsum of left hand
    - Abrasions dorsum of right hand
    - Multiple abrasions to both lower limbs.
    - Obesity (body mass index 40)
    - Hepatic steatosis
- Postmortem toxicology (day 11 after death) – no drugs or alcohol

12.3. Dr. Joanna GLENGARRY cited the cause of death as drowning.

13. SUMMARY

13.1. From tests and examinations, I believe that the dive equipment used by Dr OSUNSADE contributed to her death.

13.2. I have found the following:

- The Aquamarine dive cylinders are being breathed down to very low pressures, allowing water to ingress into the dive cylinder
- There are concerns over the frequency of the servicing of Aquamarines dive cylinders
- The combination of lack or regular servicing of the dive cylinders and water ingress is causing salt water to build, debris and aluminium oxide and salt water to block or affect the sinter filters in the regulators
- Dive cylinders must be maintained in accordance with manufacturers specifications. Any cleaning material must be removed after cleaning.
- Aquamarines regulators are in need of servicing every six months, or sooner depending on the amount of diving
- The BCD borrowed from Santo Island Fish and Dive is in need of servicing
- The dive booties being used by the Deceased were too big
- The fins used by the Deceased were too big
- The Deceased was over weighted by at least 9kg

13.3. From the enquiries made relating to the Deceased's diving ability, I have found the following:

- The Deceased was a novice diver, who has completed a number of specialty dives over an extended period of time, but did not have a lot of recreational dive experience prior to diving in Vanuatu.
- The Deceased was observed to be breathing rapidly on a number of dives, which I believe is a result of being over weighted and wearing ill-fitting dive boots and fins. As a result of this, on at least one occasion she had to be supplied with a spare air cylinder.

- There were clear warning signs the Deceased was not comfortable in the water, and these could have been addressed prior to the Deceased moving onto deeper dives, particularly inside the wreck of the SS President Coolidge.

13.4. From enquiries made, and from my own observations, Aquamarine are not planning their dives taking into account diver's abilities. I also have concerns over Aquamarine conducting short surface intervals, which are placing divers at risk of diving illnesses.

13.5. From enquiries made Aquamarine are not managing diver's maximum depths in water and once back on the surface there are no checks to ensure maximum depth and bottom times have not been exceeded. This is placing divers at risk of diving illnesses.

13.6. During dive briefings Aquamarine are not covering off what to do if divers become separated from the dive guide.

13.7. From being an ex PADI / TDI dive instructor and currently a Commercial Diver / Dive Supervisor, I find it incomprehensible that a dive guide can lose a customer in relatively good visibility, on a one on one dive. This is compelled further by the fact that the dive guide should have been aware of the Deceased's problems in the water, particularly when they were diving one on one.

- This raises serious concerns around the dive guides ability

- There are serious concerns around how Mr SYED is managing his business in a number of facets (servicing, courses, lack of servicing of the regulators, blending of gas mixtures, unsafe dive practices – surface interval duration, lack of pre and post dive buoyancy checks, air filling issues and dive cylinder testing, issuing ill-fitting dive gear to customers)

- There are also concerns around the accuracy of the statements provided by both Mr TOA and Mr SYED. Refer Sections 4.79, 5.2.34, 5.2.46, 5.3.4, 5.5.21, 5.11.56, 5.11.64, 5.16.43 and 5.17.13.

13.8. There are no surface recall systems in place should an in-water emergency occur.

13.9. I have serious concerns around the use of unlabelled dive cylinders, potentially filled with either medical grade or substitution oxygen (i.e. not intended for human use).

13.10. I have concerns around the state of the oxygen kit available at the dive site – no ability to administer oxygen in a non-breathing patient.

13.11. There was on one occasion no first aid kit at the dive site.

13.12. There are potentially no servicing records, which is of great concern, as Aquamarine is putting divers lives at risk, be it by a near miss, a case of decompression illness or another death. These records provide the basis for planning for servicing and replacement.

13.13. This death was preventable, and should not have occurred.

14. CONCLUSION

14.1. From tests and examinations, I believe that the dive equipment used by Dr OSUNSADE, and the circumstances in which she found herself in have contributed to her death.

14.2. I have noted faults with the Deceased's dive equipment, which could have been repaired / rectified prior to diving.

14.3. The Deceased had formal dive training, and should have been aware of the need to conduct a pre and post dive buoyancy check.

14.4. The Deceased should have checked her dive gear prior to committing to the dive, and should not have trusted the dive guide or Aquamarine that the gear was suitable for deep diving.

14.5. Divers should be honest about their ability and experience, and need to speak up if they have any concerns.

14.6. Aquamarine should improve their dive briefings, to cover off actions on divers becoming separated, and actions on emergency recall alarms being activated.

14.7. Aquamarine should canvass divers better to make sure their customers travel plans have been taken into account, to ensure they are not placing their customers at risk of decompression illness with insufficient surface intervals prior to flying.

14.8. Aquamarine should plan and adhere to maximum depths and bottom times. Post dive, each diver's depth should be recorded / checked post dive.

14.9. Strict surface intervals should be followed, with a minimum of four hours allowed between dives. All divers should follow dive tables and plan their next dive.

14.10. Subsequent dives should be modified if a customer has exceeded their maximum depth, or that dive should be cancelled in the interest of diver safety.

14.11. Aquamarine should only use service technicians who are qualified, and who have completed regular update courses.

14.12. Aquamarine should only use approved procedures and service kits, and should adhere to manufacturer's recommendations for service intervals.

14.13. Aquamarine should record all servicing completed against individual items.

14.14. Aquamarine should regularly service their dive compressors in accordance with manufacturer's guidelines, and record the servicing completed.

14.15. Aquamarine should ensure their staff are qualified to fill dive cylinders.

14.16. Aquamarine should internally inspect dive cylinders that are found to be low on, or out of air, to prevent/detect the build-up of water inside the dive cylinder.

14.17. The dive guides and customers should never become separated and have a plan in the event this does occur.

14.18. On behalf of the New Zealand Police, I would like to extend condolences to Dr OSUNSADE's husband, family and friends on their loss.

15. GENERAL RECOMMENDATIONS

15.1. The following are Police recommendations which the Coroner may wish to consider advising recreational divers, including those intending to dive in Vanuatu:

- All diving should be conducted with well-maintained dive equipment including in-date dive cylinders.
- Divers need to be fully conversant on how to operate their dive equipment, including dive computers and know what warning signals relate to.
- Divers need to conduct pre-dive equipment checks such as checking the equipment for correct size, leaks and must check their air quality. If the air does not smell or taste correct, demand a new dive cylinder.
- If a fault is found in a piece of dive equipment, the dive should be cancelled until the fault is remedied or faulty equipment replaced.
- Divers need to plan their dives to ensure they arrive on the surface at 50 Bar.
- Divers need to monitor air supply during the dive.
- Divers need to wear a knife whenever they dive.
- Divers when penetrating a wreck should carry two dive torches.
- Divers need to ensure they conduct pre and post dive buoyancy checks.
- Divers should follow maximum depth and bottom time stated, and if they breach these, they should advise the tour operator.
- Divers should remain in pairs or a group, and have a plan should they become separated.
- Dive guides should remain with their customers, side by side, and not become separated ever.
- Divers who have not dived, or completed deep dives in excess of 30 metres, should complete work up dives to lead into the deeper technical dives.

- Divers should have sufficient surface intervals, and should challenge tour operators who recommend short surface intervals.

- Divers need to conduct online research into dive companies they intend to dive with.

- Divers who intend on diving on the SS President Coolidge should at the very least undertake a deep diving specialty course.

- Divers who witness unacceptable practices either within New Zealand, or overseas, should report these issues or dive practices which are not deemed to be safe. If the company they dive with are affiliated to a parent company i.e. PADI / SSI etc then the complaint should be directed to them, Ministry of Business, Innovation and Employment (New Zealand) or failing that to the Government Agency in that country.

- Divers should not be put off diving in Vanuatu. It has a very good safety record.

- Divers and dive companies conducting wreck dives should consider the rule of thirds. One third cylinder contents descent and into the wreck, one third cylinder contents to come out of the wreck and to include decompression stops and one third spare. Dive companies can continue to dive with the same bottom times, by utilising twin cylinders, but they should be used in tandem with the above recommendation with the rule of thirds.

16. RECOMMENDATIONS TO DIVE INDUSTRY

16.1. The following are Police recommendations which the Coroner may wish to consider advising dive operators, including those intending to dive within Vanuatu:

- Companies should always follow manufacturer's specifications for servicing of all their rental dive equipment and dive compressors.
- Companies should always use qualified service technicians who are up-to-date with the most recent servicing clinic.
- Companies should always inspect all dive cylinders on a regular basis, as well as any dive cylinders that are low on, or found to out of air.
- Companies should always hold fully functioning medical oxygen and first aid kits. They should be fully conversant in their use, and be capable of catering for both breathing and non-breathing patients.
- Companies should always have casualty evacuation procedures in place, including a list of contact numbers for emergency services, including phone numbers for the hospital, and local recompression chambers.
- Companies should always evaluate and tailor dives to the experience and capability of their customers.
- Companies should always operate log books for their dive equipment, dive compressors and dive cylinders.

Bevan SHEFFIELD-CRANSTOUN
Police National Dive Squad
WELLINGTON

15 January 2015

17. QUALIFICATIONS

Soldier - NZ Army	1993-2004
Automotive Engineering, A-Grade	1997
Automotive Heavy Engineering - Trade Certificate	1997
Ex PADI - Open Water Instructor Qualified	1998
Ex PADI - IDCS Instructor Qualified	1999
Operator own dive business	1999-2001
Physical Training Course - NZDF	2000
Ex TDI - Instructor - Advanced Nitrox	2001
Ex TDI - Instructor - Advanced Wreck	2001
Ex TDI - Instructor - Decompression Procedures	2001
Personal Fitness Instructor	2002
RNZN - ADAS Class l Diver	2006
Intravenous Cannulation, IV and O2 Therapy	2007
Diploma in Policing	2007
RNZN - ADAS Class 2 Diver	2008
Atlantis Apollo Atomic Genesis Sherwood - Service Technician	2008
RNZN - ADAS CABA Class 1 Supervisor	2009
RNZN – SSBS Class 2 (Restricted) Supervisor	2010
O2 Therapy Course	2014

18. PEER REVIEW

I have reviewed this report, and am satisfied on reasonable grounds, that the scene examination, equipment examination, and evidence analysis are in accordance with the principals of best practice. These opinions and conclusions are subject to re-evaluation pending further evidence, information or investigations that may be forthcoming. I support the conclusions based on the findings.

_____

Senior Sergeant Bruce ADAMS
Police National Dive Squad

15 January 2015

19. DISTRIBUTION

I include the following agencies detailed below for the Coroner to consider distribution of recommendations or comments from this case;

Commissioner Vanuatu Police
Office of the Police Commissioner
Vansec House
P.M.B 014
Port Vila

Dr Lynn TAYLOR
New Zealand Underwater Association
P O Box 875
Auckland.

Allen MILNE
Director
Water Safety New Zealand
P O Box 10126
Wellington

Dr Michael Davis
South Pacific Underwater Medicine Society
PO Box 4710
Christchurch

National Diving Coordinator
Occupational Safety and Health
PO Box 19217
Hamilton

PADI Asia-Pacific
Unit 3, 4 Skyline Place
Frenchers Forrest
New South Wales 2086
Australia

Scuba Schools International (NZ) Ltd,
6 Mission Street
P O Box 13354
Tauranga

Technical Diving International (NZ),
24 Picton Street
Ponsonby
Auckland

Dive New Zealand Magazine
Editor Dave MORAN
P O Box 42020
Auckland

Professor Des GORMAN
Naval Hyperbaric Medical Unit
C/- Navy Hospital
Private Bag 32901
Devonport
Auckland

Dr. Martin SAGE
Christchurch Hospital
P O Box 29531
Fendalton
Christchurch

Dr. Michael DAVIS
Hyperbaric Medicine Unit
Private Bag 4710
Christchurch

Dr Simon STABLES
Pathologist
Auckland Hospital Mortuary
Lab Plus
Private Bag 110031
Auckland

20. REFERENCES

Andrea MATTIAZZI statement, no date
Jessica STAKER statement, 02/05/13
Craig ROBERTS statement, 02/05/13
Zara (nee CARSON) LA ROCCA statement, 02/05/13
Roger GRANSBURY statement, 02/05/13
John GRANSBURY statement, 02/05/13
Simon TOA statement, 02/05/13, not signed
David TONY statement, 02/05/13, not signed
Tula JEREMIAH, 02/05/13, not signed
David ELLABY statement, 03/05/13
Rayman LEUNG statement, 03/05/13
Simon TOA statement, 03/05/13
Translation of Simon TOA's statement, not signed
Malcolm DAVIES statement, 08/06/13
Justin AULD statement, no date

Accident Report Form, 02/03/13

Police Exhibit Sheet, Vanuatu Police, Exhibit number 27/2013
Police Exhibit Sheet, Vanuatu Police, Exhibit number 28/2013

Dr SALA, Northern Provincial Hospital Report, 02/05/13

Corporal Peter SOLWIE, Flash Report, 02/05/13

Inspector Sam SAMSON, Police Report, 04/05/13

Police 258, Constable Wayne DICKSON, not dated

Photographs - Corporal Peter SOLWIE, 02/05/13
Photographs - Sergeant SHEFFIELD-CRANSTOUN, 03/03/14
Photographs - Constable RICHARDSON, 26/03/14, Reference 14WN34861
Photographs - Constable RICHARDSON, 15/08/14, Reference 14WN35886
Photographs - Constable PENROSE, 22/08/14, Reference 14WN36049

Pathologist and ESR toxicology report, 04/07/13

Police Formal Written Statement, Sergeant SHEFFIELD-CRANSTOUN, 14/02/14
Police Formal Written Statement, Constable DICKSON, 08/09/14

David Cross statement, 03/03/14
Allan POWER statement, 03/03/14
Constable Noelline STEPHEN statement, 03/03/14

Alfred LASA statement, 03/03/14
Corporal Peter SOLWIE statement, 04/03/14
Malcolm DAVIES statement, 04/03/14
Kali CHAMBERLIN statement, 05/03/14
Michael BATCOCK statement, 05/03/14
Rehan SYED statement, version one, not signed
Rehan SYED statement, version two, not signed
Rehan SYED statement, version three, 06/03/14
Simon TOA statement, 07/03/14
David TONY statement, 07/03/14
Tula JEREMIAH statement, 07/03/14
Ian VURO statement, 07/03/14
Simon JACKSON statement, 10/09/14

Aquamarine Decompression stop schedule
Santo Island Dive Decompression stop schedule
Santo Island Dive SS President Coolidge Deck Plan

Police Exhibit Sheets, OSUNSADE/Lailande

Police Jobsheet, Constable FILIATA, 20/02/14
Police Jobsheet, Constable HARLOW, 25/03/14
Police Jobsheet, Constable FILIATA, 23/04/14
Police Jobsheet, Constable FERGUSON, 07/05/14
Police Jobsheet, Constable SEDA-CLAYTON-GREENE, 19/08/14

Deceased's dive profiles from her D9 Suunto Dive Watch

Craig ROBERTS, PNDS Questionnaire
Zara LA ROCCA, PNDS Questionnaire
John GRANSBURY, PNDS Questionnaire
Roger GRANSBURY, PNDS Questionnaire
Maurizio LA ROCCA, PNDS Questionnaire
Jessica STAKER, PNDS Questionnaire

Emails from Damien HEALY (emails between Dr OSUNSADE and Aquamarine)

Photocopies of Dr OSUNSADE's PADI certification cards
Photocopies of Dr OSUNSADE's logbook

Online article, www.michaelmcfadyenscuba.info/viewpage.php?page_id=893

Deck Plans – provided by Aquamarine (Decks C,D and E)
Deck Plans – provided by Michael McFAYDEN (hand drawn)

Regulator Test Report, Air Technology Limited, 12/05/14

ESR Dive Cylinder report and Formal Written Statement, Angus NEWTON, 17/06/14
ESR Dive Cylinder report and Formal Written Statement, Angus NEWTON, 8/09/14

21. APPENDIX

ESR Dive Cylinder report and Formal Written Statement, Angus NEWTON, 17/06/14

ESR Dive Cylinder report and Formal Written Statement, Angus NEWTON, 8/09/14

ESR Dive Cylinder report and Formal Written Statement, Angus NEWTON, 10/11/14

Otago University Report and Formal Written Statement, Dr Marco BRENNA 28/10/14

22. GLOSSARY OF TERMS

BAR……..	Barometric pressure
BCD……..	Buoyancy Compensating Device
BMI……..	Body Mass Index
CPR……..	Cardiopulmonary resuscitation
Deco……..	Decompression
ERDI……..	Emergency Response Diving International
ESR……..	Institute of Environmental Science and Research
OCCY……..	Alternate second stage regulator
Off gas……..	Time where inert gas is expelled from body tissues
PADI……..	Professional Association of Diving Instructors
PSI……..	Pounds per square inch
PNDS……..	Police National Dive Squad
Regs……..	Regulators
SDI……..	Scuba Diving International
SPG……..	Submersible Pressure Gauge
SSI……..	Scuba Schools International
TDI……..	Technical Diving International

23. PHOTOGRAPHS AND FIGURES