

2012 FAI41

Dunfermline

21 December 2012

Sheriff McSherry

SHERIFFDOM OF TAYSIDE, CENTRAL AND FIFE AT DUNFERMLINE

DETERMINATION

of

**Sheriff John Craig Cunningham
McSherry in Fatal Accident
Inquiry concerning the death of
Steven Allen, late of 5, Fullerton
Drive, Seamill, West Kilbride,
Ayrshire KA23 9US under the
Fatal Accidents and Sudden Deaths
Inquiry (Scotland) Act 1976.**

Thursday, 20 December 2012

The Sheriff, having resumed consideration of the cause, Determines:-

1. In terms of section 6(1) (a) of the Fatal Accidents and Sudden Deaths Inquiry (Scotland) Act 1976 (the Act), that Steven Allen, (Mr Allen), whose date of birth was 1st September 1966, latterly residing at 5, Fullerton Drive, Seamill, West Kilbride, Ayrshire KA23 9US, died in the vicinity of the Shell

Jetty, Aberdour, Fife with life pronounced as extinct at 1805 hours on 22nd November 2009.

2. In terms of section 6(1) (b) of the Act, that the cause of death was due to a combination of factors rather than a single pathological condition. These factors include a fatty liver and arrhythmogenic right ventricular dysplasia ending in some kind of cardiac event or arrhythmia.
3. In terms of section 6(1) (c) of the Act, there were no reasonable precautions whereby the death might have been avoided.
4. In terms of section 6(1) (d) of the Act, there were no defects in the system of working, which contributed to Mr Allen's death.
4. In terms of section 6(1) (e) of the Act, there were no other facts relevant to the circumstances of Mr Allen's death.

NOTE.

In this Inquiry the Crown was represented by Tracy Plant, Procurator Fiscal Depute, Stork Technical Services (RBG) Limited, formerly RBG Limited by Robert Leith, Solicitor, Dr Stephen Doherty by Clare Bone, Solicitor, Health and Safety Executive by John Barrie, Solicitor and Shell UK Limited by William Park, Solicitor. There were thirteen witnesses, who gave evidence over five days. The Inquiry heard oral evidence from the following witnesses, all of whom appeared following citation by the Crown:

Elizabeth Doherty, Mr Allen's partner

John Johnston, the Dive Supervisor for the dive

Calum Reay, a freelance diver who was a standby diver for the dive

Michael Bower, the Project Manager

Philip Grant, a commercial diver acting as a deckhand for the dive

Philip Baker, a Dive Supervisor who was a diver for the dive

Andrew van Ostenrijk, a diver who was a surface support diver for the dive

Alexander Nicol, a marine operative for Briggs Marine

Peter Cook, retired Health and Safety Executive Inspector

Dr Stephen Doherty, Consultant Occupational Health Physician and Approved Medical Examiner of Divers

Dr Robert Hermanns, a self-employed physician previously employed by the Health and Safety Executive

Dr Jacqueline Halliday-Bell, part-time Medical Inspector for the Health and Safety Executive

Dr Priyanjith Perera, Lecturer in Forensic Medicine who carried out the post mortem on Mr Allen

The evidence of the following witnesses was agreed by way of a Joint Minute of Agreement entered into between the parties:-

Kenneth Thompson, Dive Liaison Officer

Henry Wilson, Security Guard at Braefoot Bay

Ian Melville, Marine Operator, Briggs Marine

Gagandeep Kahlon, Operations Supervisor, Shell UK Limited

Alexander Cooper, Paramedic

Nigel Duncan, Paramedic

Stuart Darling, Ambulance Technician

Colin Rice, Police Constable

It was also agreed that the following Crown Productions are what they bear to be:

- Crown Production 3 – Occupational Health Medical Record (page 10 of the book of productions);
- Crown Production 4 – Incident Investigation Report (Shell UK Limited) (page 42 of the book of productions);
- Crown Production 5 – Accident Incident Report (RGB Marine and Subsea Operations) (page 65 of said book of productions);
- Crown Production 6 – HSE Certification of Approval (page 80 of the book of productions);
- Crown Production 7 – Accident Investigation Report by HSE (page 83 of the book of productions);
- Crown Production 8– Report by HSE re Medical Fitness to Dive (page 140 of the book of productions);

The Joint Minute further agreed the following Crown Productions:

- Crown Production 9 – GP Medical Records (page 186 of book of Productions);
- Crown Production 10 – DVD of dive by Steven Allen on 22/11/2009.

The Facts and Circumstances surrounding Mr Allen's Death.

1. On 22nd November 2009 Mr Allen was a self employed commercial diver contracted to work for RBG Limited in the vicinity of the Shell Jetty, Aberdour, Fife.
2. He held a valid certificate of fitness to dive.
3. He was a qualified and competent diver.

4. He was part of a diving team of six men.
5. This was to be his first dive at the location.
6. Shortly after all had assembled on board the diving vessel, a toolbox talk was given by the diving supervisor, John Johnston, in which he went through all safety aspects and provided a brief of the proposed dive.
7. No practice diver rescue was carried out on 22nd November 2009.
8. The diving operation had commenced on 20th November 2009 and involved a diving inspection to ascertain the condition of the piles supporting the Shell jetty structure and, in addition, the installation of a new current monitoring buoy on the seabed adjacent to the jetty.
9. During the morning of 22nd November 2009 Mr Allen was inside dive control on board the diving vessel.
10. At 1702 hours on that date Mr Allen entered the water to carry out the final dive of the day.
11. His dive was an "as left" survey of the cable installation for the new current monitoring buoy.
12. At no time did Mr Allen indicate to any of the team or any other person that he was unfit to dive.
13. While in the water before commencing the dive, Mr Johnston asked Mr Allen if everything was in order to go ahead with his dive and he indicated that it was.
14. At 1707 hours Mr Allen reached the seabed at a dive depth of 15 metres.

15. He then carried out a video survey by slowly ascending the pile and demonstrated that the current monitoring buoy cable was securely attached to the jetty pile.
16. At 1721 he surfaced and swam to the bow of the diving vessel to access its deck via a vertical ladder.
17. As soon as Mr Allen reached the ladder, the recovery equipment was dismantled.
18. As soon as Mr Allen reached the ladder, the video recording was switched off.
19. At 1722 hours he reported that he was having difficulty removing one of his fins.
20. At 1723 hours the stand-by diver, Calum Reay, entered the water to assist Mr Allen in removing his fins.
21. Mr Allen's right fin was successfully removed and, as he lifted his left leg for fin removal, he continued to roll backwards and started to invert in the water.
22. He appeared to have lost consciousness.
23. At 1725 hours Mr Reay immediately called a medical emergency and emergency recovery was initiated.
24. At 1730 Mr Allen was recovered to the deck of the diving vessel.
25. Once his diving helmet was removed he was found not to be breathing and there was no carotid pulse.
26. The members of the diving team gave CPR.

27. At 1732 hours the skipper of the diving vessel called for medical assistance as soon as possible.
28. CPR was continued with Mr Allen showing no signs of life.
29. Mr Allen was transferred to the safety boat and taken to the shore access point, the access steps at the ExxonMobil jetty.
30. At 1743 hours a terminal defibrillation unit was handed down to the safety boat but the unit could detect no fibrillation of the heart and advised continuation of CPR.
31. At 1745 hours a fast response paramedic unit arrived on site and Mr Allen was taken from the boat up the steps to the berth.
32. The paramedics took over attempts to resuscitate Mr Allen with assistance from the diving team.
33. At 1750 an ambulance arrived onsite and Mr Allen was moved to it where the medical services continued to work on him.
34. At 1805 hours Mr Allen was pronounced dead.

Submissions.

The Procurator-Fiscal Depute, Tracy Plant.

She referred to the Joint Minute of Agreement which was submitted and which agreed the date, locus and time of death together with statements from other witnesses and certain Crown productions.

As regards S6(1)(a) of the Act she referred me to the joint minute together with the evidence of the relevant witnesses which would enable me to make a finding as I have done.

As regards S6 (1)(b) of the Act, there is no evidence that the death of said Mr Allen was as a consequence of an accident. Evidence and opinion pertaining to the post-mortem examination and cause of death was provided by Dr Perera. She submitted that in addition to finding that death was a multi-factorial event, I should also find that there were possible dive related factors.

As regards S6 (1)(c) of the Act, she submitted that on the evidence of Dr Perera the death of Mr Allen was inevitable and it just so happened to occur when it did. She submitted that she did not think anything would have prevented Mr Allen's death.

As regards S6 (1)(d) of the Act she submitted that the practice of packing away rescue and resuscitation equipment when the diver reached the ladder could be construed as a defect that contributed to the death of Mr Allen. It cannot be said with any degree of certainty, or indeed definitively, that had the equipment been more readily available there could not have been an alternative outcome. The possibility that Mr Allen could have survived, remains, although the pathology evidence suggests that this was unlikely. She suggested that this practice is amended, unless it already has been, and that a determination is made that no rescue or resuscitation equipment is packed away until any diver is completely out of the water and on board the vessel; rather than the current practice of doing so once the diver reaches the surface and is at the ladder. Whilst this determination may not have made any difference to this particular death, it may well prove essential if a similar situation occurs and the individual in question does not suffer from the problems that it was later ascertained that Mr Allen did.

As regards S6 (1) (e) of the Act, while she did not consider that the variation in step-test employed by Doctor Doherty when he certified Mr Allen as being fit to dive had any causal relationship with the death of Mr Allen, she thought it to be open to me to determine that it would be preferable that the HSE prescribe a specific test to be used in order to provide uniformity in the certification process across all such medical

examinations. Dr Halliday-Bell and Dr Hermanns agreed with this. It was also her view that it may have been more prudent for Dr Doherty to have issued a restricted certificate given the history of his having done so with Mr Allen in the past, but again through reference to the pathology evidence, she do not think that this would have prevented the death of Mr Allen at that particular time and place. In any event a six month restricted certificate would still have enabled Mr Allen to dive on the date of his death.

She submitted that, while the death of Mr Allen may have happened at any time, the recommendations she suggested to me may well prevent another fatality in such circumstances.

Submissions by Clare Bone for Dr Stephen Doherty

She submitted that in terms of the various criticisms made by Drs Halliday Bell and Hermanns regarding Dr Doherty's medical assessment of the deceased, it was confirmed by Dr Halliday Bell that whilst he did not meet all the recommendations set out in the MA1, those perceived failings did not have any link with the death of the deceased. Dr Halliday Bell acknowledged that at the time of his examination on 2 September 2009, based on the evidence to hand, the deceased was fit to dive, there being no suggestion he ought not to have been certified fit to dive.

Both Dr Perera and Dr Doherty agreed it was possible to gain 13kg in weight between the date of medical examination and date of death. Dr Doherty suggested that taking no exercise and eating and drinking more could lead to such weight gain, though he could not comment on the deceased himself.

In any event, she submitted that Mr Allen had a duty in terms of regulation 13 of the Diving at Work Regulations 1997 not to dive if he was aware of anything, including any illness or medical condition, which would make him unfit to dive. He, along with the rest of the diving team, was asked on 22 November 2009 if there was anything rendering him unfit to dive. The deceased did not make any representations that he was unfit. If he had gained the suggested 13kg of weight between his examination and the date of his dive, and had not been keeping himself fit, she submitted that he would have had a duty to raise this with his dive supervisor. Equally, if he had a medical condition that might affect his ability to dive then that too ought to have been raised.

He had attended his GP on 17 November 2009 with chronic rhinitis and received a nasal spray. There was no evidence however to suggest that the deceased's weight gain and rhinitis were factors that he ought to have raised in advance of his dive.

In terms of his fitness on the day, as discussed above, no one had any concerns with his diving and indeed witness Peter Cook, having reviewed the video footage, was of the view that there was nothing in his actions in the water that led the witness to imagine he was not fit.

Dr Perera was unable to come to a conclusive view on cause of death, the death certificate stating no anatomical cause, and he suggested that the deceased's death was a multifactorial event, ending in some form of cardiac arrhythmia leading to death.

Mr Allen had a fatty liver and arrhythmogenic right ventricular dysplasia, both of which could cause sudden death. In terms of the latter, Dr Perera advised that

this was usually a post mortem finding. It was noted in any event that the ECG did not show evidence of this condition.

In terms of the presence of a fatty liver, Dr Doherty had felt the deceased's abdomen and the liver was not enlarged, there were no other signs of heavy drinking and nothing that would require him to carry out diagnostic tests to determine the presence of a fatty liver.

Dr Perera confirmed that both conditions would not have been detectable during the course of a medical assessment as carried out by Dr Doherty.

As regards S 6(1)(a) and (b) of the Act, she confirmed her agreement in the joint minute.

As regards S 6(1)(c) of the Act, she submitted that, on the basis of the evidence before the Inquiry, and commented upon by her, there are no reasonable precautions which, if taken by Dr Doherty, might have avoided the death.

She had no submissions to make in terms of either Ss 6(1)(d) or (e).

Submissions by Mr Barrie for the Health and Safety Executive.

He confirmed his agreement with the proposed findings under S 6(1) (a) and (b) of the Act.

As regards S 6(1) (c) of the Act, he submitted that no determination can be made on the evidence available on the cause of any accident resulting in the death.

He referred to Peter Cook's evidence and report which confirmed that, as regards the organisation and management of the dive, Mr Allen was provided with suitable equipment; the equipment was adequately serviced, was in good condition and appeared to

be functioning correctly. The breathing gas supplied to Mr Allen was tested and complied with the requirements of the appropriate British Standard, BS EN 12021. The dive team size was sufficient, that pre-dive dressing and preparation of the deceased diver was appropriate, the diving supervisor maintained good communications, the rate of descent and ascent was controlled and that the dive was well managed up to the point that the team recovered Mr Allen from the water. Mr Allen was qualified and competent to do the work. He was medically in date. There was no evidence to suggest that Shell failed in any of their statutory duties toward Mr Allen. There was no evidence to suggest that individual divers failed in any of their duties. Mr Allen was under a duty not to dive if he was aware of anything that might have made him unfit to dive. Mr Cook was not made aware of any information during his investigation to suggest that Mr Allen was aware of any reason why he ought not to have undertaken any diving on that day.

Mr Cook thought that RBG Ltd (now Stork) generally complied with its statutory duties towards the deceased. Mr Cook indicated inter alia that the recording of the dive should be uninterrupted. The dive supervisor Mr Johnston failed to rehearse diver recovery procedures and that this failure may have been systemic at RBG. It was an error to pack away recovery equipment before Mr Allen reached the deck of the barge. This error may have delayed recovery. However, Dr Perera's evidence was that any delay had no effect on the death.

The dive was generally well organised and managed. There is no evidence to suggest that the failings identified by Mr Cook were a cause of the death.

With reference to Mr Allen's fitness to dive, Mr Barrie noted that while Mr Allen held a certificate of fitness to dive, he was overweight. Dr Halliday-Bell was of the opinion that Dr Doherty did not fully comply with the HSE recommendations (MA1) in respect of

investigations that ought to be triggered by a finding of a BMI in excess of 30. In particular he did not objectively test his opinion that the deceased's weight was attributable to lean body mass rather than obesity by means of testing with callipers or impedance testing. He did not use the preferred fitness test but this cannot be described as a significant failing. In Dr Halliday-Bell's opinion the post mortem ruled out evidence of previous ischemic heart disease. The ECG did not demonstrate the arrhythmogenic right ventricular dysplasia found at post mortem. While Dr Doherty did not further investigate abnormalities in the full blood count conducted at the first medical examination of Mr Allen, the abnormalities in the full blood count were not considered to lead to a diagnosis of any particular condition. Dr Hermanns audited Dr Doherty and as part of that process audited Dr Doherty's medical examinations of the deceased. Dr Hermanns did not raise concerns with Dr Doherty about any of the issues highlighted above. There has been no evidence of a causal link between any of the areas in which Dr Doherty deviated from HSE recommended procedure and the causes of death. Dr Perera's report and supplementary report acknowledge that the deceased was obese but that is not in itself a cause of death. Dr Doherty's fitness test indicated that the deceased had a good level of cardio vascular fitness on each of the days that he attended for examination. The ECG did not demonstrate the presence of the heart condition identified at post mortem by Dr Perera. Dr Perera indicates in his supplementary report that arrhythmogenic right ventricular dysplasia is usually a pathological diagnosis. The abnormalities in the full blood count do not give any warning of the conditions mentioned by Dr Perera. Dr Perera's evidence was that these were conditions invariably discovered at post mortem.

He submitted that there were no grounds to criticise Dr Doherty's decision to certify the deceased as fit to dive at his medical on 2 September 2009. It is accepted that in some respects he deviated from the HSE recommended procedure but that such deviations as

were noted were not related to the cause of death and in addition, Dr Doherty took into account appropriate considerations, such as the result of the fitness test, to reach the conclusion that as at the date of the medical the deceased was fit to undertake diving without restrictions.

In conclusion, Mr Barrie submitted that there was nothing in the organisation or management of the dive or in the highlighted criticisms of Dr Doherty's conduct of the medical examinations that caused the death or the accident resulting in death.

As regards S 6(1) (d) of the Act, he submitted that there were no defects in any system of working which contributed to the death or any accident resulting in the death and that accordingly no determination should be made. The dive was well organised and well managed.

Dr Halliday-Bell had investigated the procedures for medically approving divers and she had confirmed that no such improvements were identified. Mr Barrie submitted that on this occasion there were at worst failures on the part of Dr Doherty and Dr Hermanns to fully implement the procedures rather than defects in the system itself.

As regards S 6(1) (e) of the Act, Mr Barrie submitted that no determination should be made as there were no other facts relevant to the circumstances of the death.

Mr Barrie submitted that Dr Doherty did not follow the HSE MA1 guidance document in that although he found the deceased's BMI to be greater than 30, he did not undertake further estimation of fat content using callipers or skin impedance. He relied on his impression that the deceased was muscular rather than obese.

As regards guidance on ECG testing, Dr Doherty has largely followed this guidance but has failed to document his views on the ECG.

Guidance on exercise testing recommends that the AMED undertakes an appropriate step test at each medical examination. Mr Barrie submitted that Dr Doherty failed to follow the guidance in so far as he has chosen to use a modified Chester step test rather than a standardised step test. He did not submit that the modified test used was a significant failure. The same test was used consistently at each attendance by the deceased and the deceased attained the expected level of fitness on each occasion.

Guidance on Haematology recommends that a full blood count should be performed at the first examination. Abnormalities require further investigation. Mr Barrie submitted that the full blood count performed by Dr Doherty demonstrated abnormalities. Dr Doherty has failed to document the existence of abnormalities and has not taken the expected steps to investigate them. Dr Halliday-Bell suggested that the abnormalities do not support any particular diagnosis but that nonetheless the blood test should have been repeated.

Mr Barrie submitted that there was no evidence to suggest that Dr Doherty could have or ought to have foreseen that any of the conditions mentioned by Dr Perera were present in the deceased and that they could have resulted in his death.

He also submitted that, notwithstanding his failure to adhere precisely to the guidance set out in MA1, Dr Doherty reached a reasonable conclusion in finding that as at the date of examination on 2 September 2009 Mr Allen was fit to undertake diving activities.

Dr Halliday-Bell concluded that the procedures for determining whether an individual is fit to dive and for monitoring AMEDs are fit for purpose but that on this occasion the procedures were not followed in their entirety. The need for AMEDs and HSE officials to fully comply with the procedures has been emphasised to all involved.

Submissions by William Park for Shell UK Limited.

Mr Park confirmed his agreement with the proposed findings under S 6(1) (a) and (b) of the Act.

As regards S 6(1) (c) of the Act, he submitted that on the evidence there were no reasonable precautions which, if taken by Shell, could have prevented the accident from occurring.

As regards S 6(1) (d) of the Act, he submitted that on the basis of all the evidence that the Inquiry has heard, there was no defect in any system of work used by Shell which contributed to Mr Allen's death or the accident.

As regards S 6(1) (E) of the Act he noted that the HSE's report into the incident concluded that Shell discharged its duty of care to Mr Allen. Mr Park stated that there were no additional matters which Shell would wish to bring to the court's attention under this heading.

Submissions by Robert Leith for Stork Technical Services (RBG) Limited.

He confirmed his agreement with the proposed findings under S 6(1) (a) and (b) of the Act.

He submitted that, on the evidence, the death was related to diving only in the sense that it occurred while the deceased was engaged in that activity at the time of his death. There was no evidence that the death was diving related in the sense that it was caused by something which went wrong with the diving operation.

He further submitted that it would be open to me to take the view that the cause of death has not been established.

As regards S 6(1) (c) of the Act, he submitted that there were no reasonable precautions whereby Mr Allen's death might have been avoided. There was evidence that up to the point where the dive team required to recover Mr. Allen from the water this was a well managed and uneventful dive. There had been no breach of the Diving at Work Regulations 1997 and there was no requirement for any enforcement action by way of prosecution, improvement notice or prohibition notice under the Health and Safety at Work etc. Act 1974. The early putting away of the rescue equipment, which had to be redeployed after Mr Allen had surfaced and was at the ladder. There was no evidence as to how long it would have taken to recover the deceased from the water if the rescue equipment had not had to be re-deployed. Mr Leith submitted that while there may have been a delay it was not a long one. There was no evidence that earlier recovery or CPR would have affected the outcome. The cause of death was not drowning. It was not shown that any delay caused by having to re-deploy the rescue equipment had any effect at all.

As regards the failure to rehearse the rescue, there was no evidence that the dive team were not aware how to use the equipment or that the failure to rehearse a recovery on that day caused any delay at all. The statutory duty on the supervisor is contained in the Diving at Work Regulations 1997, regulation 10. There is no specific legal requirement to carry out a rehearsal of the arrangements for dealing with emergencies. There was no evidence led at the

inquiry to indicate that failure to carry out a rehearsal for this team had any causal effect in relation to the death.

Mr Cook made reference to the design of the ladder but there was no evidence of a causal connection between the design of the ladder and the death. No evidence was led to the effect that had the deceased used the ladder or a differently designed ladder he would not have died.

As regards S 6(1)(d) of the Act Mr Leith had no separate submission to make in relation to section 6(1)(d) and referred to his submissions made in relation to section 6(1)(c). He made no submission in relation to the medical certification of divers.

As regards S6 (1) (e) he submitted that there were no other facts which are relevant to the circumstances of the death.

Conclusions.

Place and Time of death.

I have so determined as the evidence from the various eye witnesses was that Mr Allen died in the vicinity of the Shell Jetty, Aberdour, Fife with life pronounced as extinct at 1805 hours on 22nd November 2009. These facts were also agreed by all the parties in the joint minute. On reaching the ladder and while Calum Reay was about to remove Mr Allen's second fin he was seen to roll back apparently unconscious. He never regained consciousness. Emergency procedures were called for around 1735 hours. No sign of life was noted between 1735 hours and 1805 hours. While there was the emission of some vomit and some colouring being restored temporarily to his face, this was more likely to due to the intensive

CPR being employed by the various members of the diving team once Mr Allen was on board the diving vessel.

Cause of death.

There was no evidence of any accident having caused Mr Allen's death.

I make my finding having regard to the evidence of DR Priyanjith Perera, who stated that what was contained in his report of the post mortem examination, carried out by him on 26th November 2009, was his evidence. An additional report was also produced. He gave oral evidence by TV link from Colombo, Sri Lanka. He said that death was not caused by any anatomical cause. There was no evidence of drowning. On dissecting the organs the right ventricle of the heart revealed fatty tissue which was a diagnosis detectable pathologically but not in life. He said that this condition can cause death. Similarly, he noted fatty tissue in the liver which may affect adversely the cardiac conduction system, which controls heart function. This may also cause sudden death. This would only be detectable in life by appearance of a symptom such as diabetes, abdominal pain and/or excessive alcohol consumption. It could be detected by tests and a scan of the abdomen. If the liver was found to be enlarged, this might be due to many other causes. It would not be detected in a routine medical examination. He concluded that death was as a result of a multifactorial event resulting in some kind of cardiac event. Both the heart and liver conditions were independently and together capable of causing death.

In the death certificate he had stated that there was no anatomical cause, that further investigations were pending and that there were possible dive related

factors. The further investigations were into evidence of alcohol or drugs in Mr Allen's system. The resulting forensic toxicology report dated 16th December 2009 was that all analyses gave a negative result.

By "dive related factors" I take it that he meant what he said in his report, namely, that death was more likely to have been due to a combination of many conditions, which were exacerbated by the act of diving. In his oral evidence he said that, while his opinion was that the cause of death was something to do with diving, he could not reach a definite conclusion as he could not see any concrete evidence of any dive related possible cause of death. He found that histopathology of the lungs demonstrated findings consistent with sudden decompression but there was no other post mortem evidence of arterial or venous air embolisms. There was no evidence of sudden decompression taking place during the dive, which was a relatively shallow dive. There was no evidence of drowning. Dr Perera admitted that Mr Allen could have died at any time, that is, even if not diving. It is for the foregoing reasons that I do not find that the cause of death was related to Mr Allen having been involved in diving. There was no evidence of anything related to the diving operation which might have caused death, which distinguishes it from the above stated heart and liver conditions.

While Dr Perera was of the opinion that Mr Allen was obese at the time of his death, there was no medical evidence given by any of Drs Perera, Hermanns, Doherty or Halliday-Bell to the effect that obesity was a cause of death.

While I accept that there is no definite cause of death established in this case, I have to regard medicine as an inexact science. The opinion of the pathologist, Dr

Perera as to the most likely causes of death based upon his post mortem examination is, in my view, sufficient to enable me to make my finding.

Reasonable precautions whereby death might have been avoided.

I have made my finding as there was no evidence of any reasonable precaution which, if taken, might have avoided Mr Allen's death. The Inquiry in this respect focused on the health of Mr Allen and, in particular, his fitness to dive.

Commercial diving operations are regulated by the Diving at Work Regulations 1997 made under the Health and Safety at Work, etc, Act 1974. These regulations are enforced by the HSE.

To have been employed as a professional diver, Mr Allen required to have been competently trained and qualified and there was no evidence presented to the contrary.

However, in addition to training and qualification, he was further required by Regulation 12 of the regulations to hold a valid medical certificate of fitness to dive for a maximum period of 12 months. Such a certificate is issued by a medical practitioner who has been appointed as an Approved Medical Examiner of Divers, (AMED) by the Health and Safety Executive (HSE). The approval certification of such AMEDs is reviewed every 5 years in document MA1.

Mr Allen attended various examinations which were carried out by Dr Doherty. Report forms MA2 in respect of these were produced by the Crown.

The initial examination took place on 3rd May 2007. Dr Doherty recorded his findings in a form MA2 as required. Mr Allen estimated his alcohol consumption to

be 30 units per week. His BMI was calculated as being 33 and weight was 115kg. Dr Doherty carried out a Modified Chester Step test and found the pursuer to be fit with a VO2 Max of 45 ml/kg/min. He confirmed that the ECG and full blood count required at initial examination have been performed. He issued Mr Allen with a certificate of fitness to dive with a time restriction of 6 months and advice was given to him regarding the high BMI, which was over 30 as Dr Doherty was required to do in terms of the regulations. In his handwritten note Dr Doherty formed the impression that Mr Allen's body was more muscle than fat. He undertook a range of further tests and examinations before conducting the fitness test.

The examination on 15th October 2007 recorded that Mr Allen said that he had reduced his alcohol consumption to 5 units per week. His BMI was 34 and weight was 115kg. Dr Doherty issued Mr Allen with a certificate of fitness to dive restricted to 6 months.

The examination on 17th September 2008 recorded that Mr Allen's alcohol consumption was 5 units per week. His BMI was 33 and his weight was 112kgs. Dr Doherty issued Mr Allen with an unrestricted certificate of fitness to dive for 12 months.

The examination on 2nd September 2009 recorded that alcohol consumption was 10 units per week. BMI is 33 with weight recorded as 112kg. The modified Chester step test was used again and a VO2 Max of 44 ml/kg/min was calculated. No haematology test or ECG was carried out. Dr Doherty issued Mr Allen with an unrestricted certificate of fitness to dive for 12 months. He noted that Mr Allen had less fat and more muscle. The VO2 max was 44 ml/kg/min.

In his post mortem report Dr Perera described Mr Allen as a big obese man with fat on his body. His weight was 125 kg and BMI was 36.1. Dr Perera regarded the BMI as high. Accordingly, in the space of some 11 weeks Mr Allen had put on an extra 12 or 13 kg. Drs Doherty and Perera accepted that it was possible to gain this amount of weight in such a period.

There was no evidence that Dr Doherty could have or ought to have foreseen that any of the conditions mentioned by Dr Perera was present when Mr Allen was examined, as they are usually identified after death unless Mr Allen had complained of symptoms. He had not indicated that he was unwell in any respect to Dr Doherty and accordingly there was no need for further ECG. Elizabeth Doherty, who was Mr Allen's partner, gave evidence that she thought him fit, if a bit overweight. He had had rhinitis, which was unconnected to any of the conditions above mentioned, just before his last medical examination and she thought that this might have made him rather underweight. His last dive before 22nd November 2009 had been in Tunisia in August 2009. She said he had never voiced any health concerns to her. He attended the gym regularly, did not drink to excess and ate healthily. In terms of the Regulation 13 of the regulations Mr Allen was under a duty not to dive if he was aware of anything, including any illness or medical condition, which would make him unfit to dive. There was evidence from the other members of the diving team and the diving supervisor that Mr Allen had not made them aware of any illness or medical condition.

Dr Perera had found Mr Allen to be obese and this was at odds with the finding of less fat and more muscle by Dr Doherty as the last examination of Mr Allen.

Attention, accordingly, was focused on the methods used by Dr Doherty in making his assessment of the fitness to dive of Mr Allen.

Dr Doherty was a consultant occupational physician. He had been an AMED since 1994. By 2009 he was carrying out approximately 50-60 diver examinations a year. At the time of giving evidence he was still an AMED but through choice had not carried out examination in the previous year. He used the modified Chester step test to measure VO2 max this is the maximum volume of oxygen used during aerobic activity. It provided a very rough estimate of fitness and was not entirely accurate. His clinical practice involved this test based on pulse rates with sets of exercising. The HSE guidelines in the MA1 document state that exercise tests should be done. He said that there was nothing in the guidelines that demanded that the Chester step test should be used. His tests involved 5 minutes of exercise stepping on and off a 30cm high box in time with a metronome beat over 5 minutes. He would then calculate the pulse rate per minute. Age reduced pulse rate. He accepted that the modern Chester step test involved incremental increases in the step rate with pulse rate measurement taken at each stage. He would converse with Mr Allen during the exercise as once there was a moderately hard stage of exertion Mr Allen would find conversation difficult. He had restricted Mr Allen's initial certificate of fitness to dive for a period of 6 months because, although he thought him fit, the HSE guidelines indicated that a diver should be cautioned to lose weight if his BMI was 30 or above. He had lost 3 kgs by the examination on 17th September 2008 and he gave him a certificate for one year. Dr Doherty said that the whole picture had to be looked at in carrying out these examinations. Weight was not the only factor. He said that if Mr Allen had not

been so muscular and if he had had prominent fat pads on the front of his body and thighs, he would not have passed him as fit to dive, even if his BMI had been 30 or 31.

Dr Hermanns, who at the material time was employed by the HSE as a diving inspector, had audited AMEDs including Dr Doherty and his examination of Mr Allen. He approved Dr Doherty's certification as an AMED. However he and Dr Halliday-Bell regarded the modern Chester step test as preferable, as it was incremental and gave a more accurate indication of fitness. There is no single type of step test prescribed by the regulations or guidance. While this may make such tests reproducible, it is noteworthy that there is no consensus amongst medical practitioners employed as AMEDs as to any particular test which should be used. Dr Halliday-Bell said that even the Chester step test can be inaccurate.

I would agree with Dr Doherty that the view of the medical practitioner who knows the diver and has actually examined him and used the findings of such examination coupled with his clinical experience to certify a diver as fit is to be preferred to that of a practitioner such as Dr Hermanns who is simply forming an *ex post facto* judgement on the reports in front of him. In any event, Dr Hermanns did not consider Mr Allen to have been unfit to dive.

As to the question of obesity, Dr Halliday-Bell was critical of Dr Doherty's failure to use callipers or impedance to determine Mr Allen's fat distribution as provided for in the guidance. However, Dr Doherty's position was that Mr Allen was not fat but muscular with an even distribution of fat on his body. He pointed out that professional boxers may have a very high BMI but be quite fit.

What is of note is that no medical practitioner gave evidence that, on the record of Dr Doherty's last examination of Mr Allen, he was considered anything other than fit to dive.

The additional body fat found at post mortem might be explained by Mr Allen's weight having substantially increased in the period between the last examination and the post mortem.

Again in respect to fitness to dive, Mr Johnston believed that at times during the dive Mr Allen appeared to be breathing heavily. Mr Cook did not agree and invited some of his colleagues to view the video recording of the dive. He reported that they also were not of the view that Mr Allen was breathing particularly heavily.

Mr Johnston and the rest of the team were of the view that Mr Allen appeared quite fit with a rugby player's type of build.

Accordingly, there was no evidence that at the time of his last examination or at the time of the dive, Mr Allen was unfit to dive.

Dr Halliday-Bell was of the view that at the initial test there had been blood abnormalities shown and that Dr Doherty ought to have followed this up. However, she went on to say that the abnormalities did not support any particular diagnosis.

I believe that it is worth mentioning that there was no financial compulsion on Mr Allen to undertake the dive, if unfit. Mr Johnston confirmed to me that if Mr Allen had indicated that he was not able to dive for whatever reason he would still have received his contracted fee. Once the helmet is in place even a simple snuffle could present huge problems for a diver.

Defects in the system of working.

I have made my finding as there was no evidence that there were any such defects which contributed to Mr Allen's death.

The dive was uneventful. It was recorded on video and audio. A toolbox talk was given at the commencement of the day in which the dive was discussed and safety features highlighted. There was a rescue boat in position alongside the diving vessel. Mr Allen was fully equipped. The dive was well managed. As he was new to the team, Mr Johnston let him have the last dive of the day to show that the cable installation was in place. The depth was only 15 metres. There was a standby diver, Mr Reay, ready to go into the water to assist Mr Allen if required. The members of the diving team were experienced divers and four of them were diver medics who had been hospital trained to carry out medical procedures if required in an emergency.

Diver rescue practice.

There was criticism by Mr Cook of there not having been a diver rescue practice. One had taken place with a team not including Mr Allen some days before. The members of the diving team were experienced and their evidence was that each knew exactly what to do in the emergency which arose when Mr Allen lost consciousness. There is no evidence that the failure to have a diver rescue practice on the day in question was relevant to Mr Allen's death.

Switching off video recording and putting away the diver recovery lifting gear.

Mr Cook also criticised the switching off of the video recording and the putting away of the recovery lifting gear. Mr Johnston said that as soon as Mr Allen reached the ladder he had considered the dive to have terminated and switched

off the video recording. The recovery lifting gear was also put away as soon as Mr Allen reached the ladder. The fact that this was the last dive of the day may be an explanation. It did take up to 5 minutes to get Mr Allen out of the water but given the fact that he showed no signs of life such delay cannot be held to have contributed to his death. However, in other circumstances it could have been a factor.

I believe that it makes good practice for the dive to be regarded as terminated once the diver is physically and safely on board the diving vessel. I understand that this is now the practice. Video recording should only be terminated and the diver recovery only equipment put away when the diver is physically and safely on board the diving vessel.

Ladder.

Mr Cook also questioned the type of ladder employed but there was no evidence that the type of ladder mattered. It certainly was of no relevance to this incident.

There were no other facts relevant to the circumstances of Mr Allen's death.

My sincere condolences go out to Mr Allen's family.

John Craig Cunningham McSherry

Sheriff of Tayside, Central and Fife at Dunfermline

Thursday, 20 December 2012

«CASEREF»

«CASENAME»