Coroners Act, 1996
[Section 26(1)]

Western Australia

RECORD OF INVESTIGATION INTO DEATH

Ref No: 17/16

I, Rosalinda Vincenza Clorinda FOGLIANI, State Coroner, having investigated the death of ***Shaun McBRIDE****, with an Inquest held at Perth Coroner's Court, 501 Hay Street Perth on 17-18 May 2016 and 26 May 2016 find that the identity of the deceased person was* ***Shaun McBRIDE*** *and that death occurred on 4 June 2011 at Rio Tinto Wharf, East Intercourse Island, Dampier as a result of drowning in the following circumstances -*

Counsel Appearing:

Mr Toby Bishop assisting the State Coroner
Mr Jeremy Johnston appeared on behalf of the Department of Mines and Petroleum

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INTRODUCTION

1. On 4 June 2011 Mr Shaun McBride (the deceased) was working as a scaffolder at Rio Tinto Iron Ore's Dampier Operations at East Intercourse Island, located within the Dampier archipelago off the north-west coast of Western Australia. He was working as part of a team to dismantle a cantilevered scaffold structure that had been erected underneath the iron ore loading jetty. He was therefore working over water on a mine site.

2. At approximately midday on 4 June 2011 during the course of the deceased's work, part of the scaffold structure collapsed, causing him to fall from the cantilevered platform attached to the hanging scaffold under the jetty, directly into the water below. Some of the scaffolding also fell into the water. The water was between 15 – 18 metres deep at that time and the deceased fell approximately 4.8 metres before he entered the water. Tragically the deceased did not resurface, and he died shortly afterwards as a result of drowning.

3. The deceased's fall into the water was not observed, but it was apprehended instantly, because it was preceded by a loud noise and a splashing sound. The other members of his team were in close proximity. His hard hat was floating on the water. The alarm was promptly raised. A colleague immediately jumped into the water but could not locate the deceased due to a lack of visibility underwater. Two crew members of a commercial vessel close by also jumped into the water, but were similarly hampered by lack of visibility.

4. The North West Water Police and the West Pilbara Volunteer Marine Rescue vessel were deployed to the scene by water, but their immediate water search of the area also failed to locate the deceased.

5. The Water Police Dive Squad in Fremantle was contacted for the purpose of undertaking an underwater search. The Dive Squad were deployed and arrived at the Karratha Airport on board Police Airwing fixed wing aircraft at 8.40 pm on 4 June 2011.

6. The police divers commenced an underwater search directly below the part of the scaffold structure where the deceased was last known to have been sitting. At about 10.47 pm, a police diver located the deceased on the seabed. The depth

at that point was 15.7 metres with a visibility of about two metres.

7. The deceased was located lying on the seabed near a portion of the scaffold, but his body harness was not attached to the scaffold. It was unclear to the investigators as to whether he was harnessed to any part of the scaffold when he fell into the water. The circumstances under which he was found indicate that he was conscious for a brief period when he entered the water, and that he had attempted to divest himself of tools, heavy clothing and safety gear. The deceased's body was brought to the surface at 11.45 pm that night.

8. The deceased was not wearing a personal flotation device when he was dismantling the scaffold over water. It was not industry practice at that time. He was wearing a full body fall arrest harness with twin combination inertia reel lanyards that were fitted with clasps, referred to as safety hooks. Neither the fall arrest harness nor the lanyards showed sign of deployment.

9. The inquest focussed on the safety measures available to the deceased for the purpose of preventing a fall into water, the reasons for the partial collapse of the scaffold, whether the deceased utilised his fall arrest system, the practices within the scaffolding industry concerning the wearing of personal flotation devices when working over water and whether any recommendation concerning those industry practices can be made to improve safety for persons working over water.

THE DECEASED

10. The deceased was born into a loving family on 20 January 1983 in Ireland. The news of his sudden and unexpected death so far away from his home in Donegal exacerbated his family's grief and left them searching for answers about the events surrounding the last hours of his life.

11. His death at the age of 28 years was a loss to his family and to the community. At the inquest I sought information about the deceased from his family, to gain an impression of his character. When person dies in the course of working, much of the investigative effort is, properly and

understandably, focussed upon the workplace procedures and the events that have given rise to the tragedy.

12. The inquest however presents an opportunity for the coroner to take a broader view and consider the human impact of a workplace death. The information provided by deceased's family reflects his personality traits of loyalty and connection to his family, and liveliness and engagement with the wider community.

13. The deceased particularly enjoyed his work as a scaffolder, and he was delighted when in 2011 Celtic Scaffolding sponsored his travel to Australia to work in that capacity. His interest in scaffolding had commenced at an early stage in his life, shortly after he left school.

14. He was clearly a very capable student at school. As a youngster when he left school he went to college to study civil engineering. During his first summer vacation, he went to Dublin and secured work with a scaffolding company. From that time onwards, he knew that he wanted to be a scaffolder, so much so that he eventually ceased his college studies in order to focus on his scaffolding work.

15. Over a period of six years, the deceased worked as a scaffolder in Dublin and then in London. He continued to enjoy this role. In the latter part of 2008, the deceased left his home in Donegal and travelled to Australia with the hope of starting his new life here. His family describes his experiences as follows: "….*to say that he enjoyed his time in Australia would not do it justice*…."[1]

16. After the deceased travelled to Australia, he continued to return home at intervals to be with his family. With his friendly and sociable nature, and his hardworking approach, it is unsurprising to find that he was gainfully employed and well-liked by those around him.

17. The deceased seized his working opportunities and he was socially connected in his community. At the time of his death the deceased was young, full of vitality and in the process of making a life for himself in Australia. His family are justifiably proud of his achievements in his 28 years.

[1] Exhibit 1, tab 50

THE INQUEST

18. The deceased's death was a reportable death within the meaning of s 3 of the *Coroners Act* 1996 (the Coroners Act) and it was reported to the coroner as required by s 17 the Coroners Act. By reason of s 19(1) of the Coroners Act I have jurisdiction to investigate the deceased's death.

19. Pursuant to s 25(1)(b) and (c) of the Coroners Act, my primary function has been to find, if possible, how the deceased's death occurred and the cause of his death. It is a fact-finding function.

20. It was desirable to hold an inquest, within the meaning of s 22(2) of the Coroners Act, in order to address the circumstances attending the deceased's death. In particular, I explored the cause of the partial collapse of the scaffold structure, whether the deceased was likely to have been aware of the correct usage of the fall arrest system, and whether his fall was as a result of an incorrect usage of that system, or the partial collapse of the scaffold structure, or both.

21. Pursuant to s 25(2) of the Coroners Act, in this finding I may comment on any matter connected with the deceased's death including public health, safety or the administration of justice. This is the ancillary function. Within this context I explored whether the deceased's death by drowning may have been prevented if he was wearing a personal flotation device, and whether the wearing of such devices for persons working over water ought to be supported by amendments to relevant Australian Standards.

22. Section 25(5) of the Coroners Act prohibits me from framing a finding or comment in such a way as to appear to determine any question of civil liability or to suggest that any person is guilty of an offence. It is not my role to assess the evidence for civil or criminal liability, and I am not bound by the rules of evidence.

23. Pursuant to s 44(2) I must not make any finding adverse to the interests of an interested person without giving that person an opportunity to present submissions against the making of such a finding.

24. I held an inquest into the deceased's death and heard evidence from nine witnesses between 17-18 May 2016 and

26 May 2016. I received one exhibit (tabs 1 to 54.7) into evidence.

25. After the evidence was taken at the inquest, submissions were provided to me between 14 July 2016 and 4 August 2016 with respect to a recommendation for the scaffolding industry to adopt the usage of personal flotation devices, for workers' safety when working over water.

26. My findings appear below.

THE DECEASED'S SCAFFOLDING WORK

27. The deceased was a scaffolder employed by Celtic Scaffolding Pty Ltd (Celtic Scaffolding). He had been recruited from Ireland and sponsored by Celtic Scaffolding pursuant to a 457 visa. He had been working as a scaffolder since 2003.

28. The deceased was first issued with a licence to perform high-risk work (Advanced Scaffolding) in Ireland in May 2005, which qualified him to erect and dismantle a hanging scaffold. As at June 2011 the deceased also held a current a licence to perform high risk work (class SA, Advanced Scaffolder) issued in Western Australia by WorkSafe WA in September 2009 and valid for five years.

29. The deceased had received formal training in working safely at heights through Safe Right Australia Pty Ltd, and had been issued with a Work Safely at Heights qualification by the Safe Right Training Academy. Celtic Scaffolding assessed him for competency as a scaffolder. His employment records reflect that he was knowledgeable in his area, competent and hardworking. He was also a good team worker.[2]

30. Celtic Scaffolding was engaged by Freyssinet Australia Pty Ltd (Freyssinet) to erect and dismantle the scaffold structure underneath Rio Tinto's iron ore jetty at East Intercourse Island. The scaffold structure and walkway was required for the purpose of undertaking the East Intercourse Island wharf upgrade. Freyssinet was the main contractor on site for the wharf upgrade and was engaged by Rio Tinto subsidiary Hamersley Iron Pty Ltd.

[2] Exhibit 1, tab 35

31. As part of the East Intercourse Island wharf upgrade contractors were required to conduct maintenance on the cathodic protection system on the jetty. The maintenance project had been ongoing for approximately six weeks. The maintenance workers accessed the scaffold structure's walkway in order to undertake their tasks.

32. When maintenance tasks on sections of the jetty were complete, the scaffold was removed and erected in a new location along the jetty. It is referred to as a hanging scaffold because it was attached to the underside of the jetty, and hung approximately four to eight metres above the seawater, depending on the height of the tide.

33. I am satisfied that the deceased was appropriately qualified in order to undertake his work to dismantle the hanging scaffold under the jetty.

The Layher Allround scaffold system

34. A scaffold is a temporary structure, specifically erected to support access to working platforms.

35. In this case the entire structure hung over the water underneath the East Intercourse Island jetty at Rio Tinto's operations at Intercourse Island. It was known as a "*cantilever scaffold*" because it was supported by cantilevered load bearing members.[3]

36. Celtic Scaffolding was utilising prefabricated equipment to be assembled and disassembled by the scaffolders, known as a rosette scaffold system. The equipment was manufactured by Layher, a German company with branches in Australia. Components such as ledgers, transoms and braces connect at the one level to a rosette welded to the standard.[4]

37. The ledger is the horizontal structural member of the scaffold connecting the adjacent standards normally in the

[3] AS/NZ 1576.1:2010; ts 161
[4] Exhibit 1, tabs 8 and 22

direction of a larger dimension of a bay.[5] The deceased was positioned on a ledger when it gave way and collapsed.

38. The transom is the horizontal structural member of a scaffold that connects adjacent standards, normally in the direction of the smaller dimension of the bay. The standard is the vertical structural member that transmits a load to the supporting structure. The brace is fixed to two or more members of a scaffold to increase rigidity.[6] The ledger, transom and brace are connected by wedges secured into the rosettes on the standard.

39. The rosette is a circular slotted disc that in this case was welded around each Layher standard at intervals of 500 millimetres. Each rosette had a series of eight equally spaced slots designed to accommodate the wedges.[7]

40. The Layher scaffold system is well-known and reputable. It is also known to be a simple system to assemble and disassemble, in that there are no clamps, nuts or bolts. The design accommodates a captive wedge within a "U" shaped cast claw at the end of each ledger and transom. This cast claw fits horizontally over and under a matching rosette. The full height of the standard is three metres.[8]

41. As the wedge is captive, the scaffolder does not need to carry a bag of wedges. The scaffolder only needs a hammer to assemble and disassemble the scaffold (with the exception of securing the scaffold system to an existing structure where clamps and fixtures may be used).[9]

42. For example, in order to secure a ledger to a rosette, the wedge lays against the ledger tube until it is dropped into the rosette slot by hand and the wedge is then secured by striking with a hammer. Until the wedge passes through the slot in the rosette the component does not have any resistance to horizontal movement. Removal is the opposite sequence. The wedge is loosened by striking it with a hammer and then lifting it by hand until it is clear of the

[5] AS/NZ 1576.1:2010; the bay is the horizontal distance between the centres of any two longitudinally adjacent standards or members, serving the purpose of standards, including spurs or cantilevered beams.
[6] AS/NZ 1576.1:2010
[7] Exhibit 1, tabs 8 and 31
[8] Exhibit 1, tab 8
[9] Exhibit 1, tab 8

rosette. The wedge can then be laid on the component to facilitate removal of the component from the scaffold.[10]

43. When a rosette scaffolding system is used on a building site, components such as braces are typically disconnected from a standard whilst the scaffolder is standing on a full deck of scaffold planks with a full view of the wedges at the connection, making an unintentional loosening of the wrong wedge very unlikely.[11]

44. In the case of the hanging scaffold such as the one being dismantled by the deceased however, the scaffolder is required to reach underneath and swing the hammer in an upward arc with the intention of knocking out one specific wedge, but without a full view of the wedges.[12] This increases the risk of a scaffolder inadvertently knocking out the wrong wedge. In some cases, this can precipitate the collapse of a scaffold.

45. When the deceased fell into the water, he had been in the process of removing the transom. To achieve this he needed to correctly hammer out the transom wedge. The inquest explored the questions of whether he hammered out the wrong wedge, and/or whether there was any inherent defect in the scaffold structure or its components, such as to cause or contribute to the partial collapse of the scaffold.

The safety measures available to the deceased

46. Having regard to the risks involved in the deceased's work, an analysis of the safety measures available to him is critical. This includes the Job Hazard Analysis procedures, the Work Method Statement, his supervision, and his safety equipment. Specifically in the context of the circumstances surrounding his death, it includes an analysis of whether he was adequately informed of the proper manner in which his fall arrest system was to be utilised.

47. The deceased was part of Celtic Scaffolding's four-person scaffold team responsible for dismantling the scaffold under the jetty. The scaffold team comprised the deceased and Messrs Andrew Beard, David Jarkiewicz and Justin Willey.

[10] Exhibit 1, tab 32
[11] Exhibit 1, tab 32
[12] Exhibit 1, tab 8

They worked 12-hour days on a fly in fly out roster system of 21 days on and 12 days off.

48. Celtic Scaffolding was established in 1996 by Mr Damien Beausang, an experienced scaffolder himself, who first obtained his qualifications in Ireland in 1980. He became qualified as an advanced scaffolder in 1991. He gave evidence at the inquest and testified that each member of the four-person scaffold team was an experienced scaffolder.[13]

49. On 4 June 2011 the Celtic Scaffolding team arrived on site at approximately 5.50 am for their day shift, and a pre-start meeting was held to discuss the scaffold team's activities for that day.

50. In addition to that pre-start meeting, between 6.30 am and 7.00 am on 4 June 2011 a Rio Tinto project supervisor attended the East Intercourse Island jetty and conducted a general work start meeting with all the workers involved in the maintenance project. The works that had been completed and the works that were to be commenced for the day were discussed. No health, safety or environmental issues were raised during this meeting and accordingly work on the maintenance project commenced.

51. The scaffold team's first activity for that day comprised tidying up the materials in the lay down yard, and fencing the yard. At approximately 11.30 am the scaffold team when to the wharf area to commence work on dismantling the suspended scaffold structure under the jetty. The scaffold was approximately six metres above the water at high tide. It had been erected under the jetty approximately one month earlier to provide access for the maintenance crew.

52. Mr Beard, an advanced scaffolder of about 29 years' experience was the supervisor. Prior to commencing the dismantling work under the jetty, the scaffold team conducted a Job Hazard Analysis and each scaffolder went through a basic pre-start safety checklist, known as a "*take five*" procedure. It was agreed that the deceased and Messrs Beard and Jarkiewicz would go down on the scaffold, and Mr Willey would remain on top to collect the dismantled

[13] ts 151 – 152; ts 160 - 161

components, and also be on standby in the event of an emergency.

53. The take five procedure documentation stipulated the need for a 100% hook-on. This was a reference to a procedure for attaching (hooking on) to a fixed point on the scaffold to arrest a fall. The deceased was equipped with, and wearing a fall arrest harness with twin inertia reel lanyards, each with a safety hook on the end. The purpose of having the twin lanyards was to enable the scaffolder to maintain 100% hook on when moving about on the scaffold.

54. The intent was for the scaffolder's fall arrest system to be hooked on to the correct attachment point on the scaffold structure 100% of the time so that in the event of a fall, the scaffolder would be captured in the harness.

55. When a scaffolder needed to change position, while hooked on with the safety hook of the first lanyard, the scaffolder would move over to the next position and then attach the second lanyard by its safety hook. Then the scaffolder would step back and disconnect the first lanyard and move back to the new position whilst always remaining attached (hooked on).

56. The efficacy of the fall arrest system was reliant on the scaffolder hooking on to the correct load bearing attachment point. The manufacturer of the Layher Allround scaffold system specified the attachment points for fall arrest equipment as being:

- the rosette in a continuous standard at the level where the ledgers are fitted, or to a maximum of one metre above the ledger; or
- the rosette on the inside of the scaffolding where there is a continuous standard without a joint.[14]

57. There were such rosettes on the end of the hanging scaffold under the jetty where the deceased was working immediately before he fell. They were located where the cantilever platform was connected and they met the manufacturers criteria for use as an anchorage point for the purpose of attaching fall arrest equipment.

[14] Exhibit 1, tab 43

58. The Department of Mines and Petroleum conducted an investigation (addressed in greater detail later in this finding). With respect to the deceased's fall arrest system, the Department found (and I accept) that it was in good condition and fully functional, but it was not activated. The fall indicator on the fall arrest harness attachment point showed no red indicators or any sign of deployment. The shock absorbers on both personal fall limiters showed no sign of deployment.[15]

59. I am therefore satisfied that at the time of the scaffold's collapse and the deceased's fall into the water, his fall arrest system could not have been attached to any of the vacant slots in the rosette on the end standard of the hanging scaffold.

60. Given that the deceased ought to have hooked on to this rosette, and maintained 100% hook-on, at the inquest witnesses were questioned as to their knowledge of this procedure and the availability of this information.

61. Celtic Scaffolding's managing director Mr Beausang gave evidence about the pre-start procedures. At the material time Celtic Scaffolding had a Work Method Statement that the scaffolders were required to review every morning before they signed onto their Job Safety Hazard Analysis sheets for the day, before commencing work. It was kept in the site shed.[16]

62. Mr Beausang confirmed that the scaffold that the deceased was dismantling was a "*cantilever scaffold*". The Work Method Statement outlined the process for dismantling the cantilever scaffold, which was a reversal of the erection sequence. The first relevant requirement on the Work Method Statement was: "*Scaffolder is to ensure 100% hook on.*"

63. Mr Beausang explained that this required the scaffolder to hook one lanyard onto the rosette on the standard that was supporting the cantilever (as opposed to the rosette on the outside standard, because that one was not load-bearing, as it was not fixed to the jetty). He referred to the rosette on the supporting standard as the "*node point.*" The other

[15] Exhibit 1, tab 8
[16] ts 160 – 161; Exhibit 1, tab 38

lanyard was to be kept free for when the scaffolder wanted to move to another location.[17]

64. Mr Beausang testified that he believed the deceased knew how to achieve 100% hook-on due to his level of experience and the provision of the Work Method Statement.[18] The Work Method Statement did not however describe how 100% hook-on was to be achieved.

65. The supervisor Mr Beard gave evidence on this point. He explained that in addition to the Work Method Statement, the scaffold team also had the Layher Allround scaffold system manual with diagrams that showed how to achieve 100% hook-on. The diagrams outlined three options for achieving attachment points rated as anchorage points in accordance with AS/NZ 1891.4:2009:

- To a continuous standard (standard going all the way through the height of the scaffolding level and without a joint), maximum one metre above the scaffolding level;
- To a rosette at the level of the ledgers (that are already fitted);
- To any rosette inside an assembled and finished scaffolding level.[19]

66. The purpose of connecting to a rosette on the standard that is fixed to the jetty is that this standard can absorb the high transverse tensile force on the inside caused by a fall. Mr Beard testified that each member of the scaffold team would go through those diagrams and that the deceased had previously dismantled over a dozen cantilevered scaffolds as part of his team with no problems. There was also a Celtic Scaffolding Manual with similar diagrams showing 100% hook on with the Layher Allround scaffold system.[20]

67. Mr Beard opined that it is probably known in the scaffold industry that hooking on to the rosette provides for a more structurally sound anchor point. He testified that he would hook on to a rosette in preference to the structural steel on the jetty, because the scaffolder would not know what load the latter can accommodate in the event of a fall.[21]

[17] ts 163 – 164
[18] ts 165
[19] Exhibit 1, tab 43
[20] ts 243 – 245; Exhibit 1, tabs 38 and 43
[21] ts 253 - 254

68. Whilst Mr Beard did not hook on to a ledger on this job, he testified that he might do so in circumstances where it was a full bay, not a half-dismantled bay. He confirmed he would not have hooked on to the ledger that the deceased was standing upon, nor onto the brace holding it.[22]

69. Mr Jarkiewicz was a member of the scaffold team on 4 June 2011. He had approximately 11 years' prior experience and was qualified as an advanced scaffolder. He testified that, at a general level, he would probably have had discussions with "*hundreds*" of persons about how to dismantle this type of cantilever scaffold. Specifically he believed he would also have discussed it with the scaffold team members who were undertaking the dismantling work on 4 June 2011. In his experience, when the scaffold team commenced a new job, Celtic Scaffolding provided the team with a relevant Work Method Statement and Job Hazard Analysis Sheets, and copies were kept on site.[23]

70. Mr Jarkiewicz referred to the order in which the scaffold components are to be dismantled. His evidence was that during this process, he would ideally hook on to the highest rosette above his head on the wharf side standard of the scaffold, if it was not possible to hook on to the structural steel of the jetty. He was aware that on the Layher Allround scaffold system, those rosettes had the appropriate structural integrity. However, unlike Mr Beard, he was prepared to consider hooking on to the structural steel of the jetty, and as a first option.[24]

71. Consistent with the practice outlined by Mr Beausang, Mr Jarkiewicz' practice was to hook on at all times with one lanyard, leaving the other one free, thereby achieving 100% hook-on. However, Mr Jarkiewicz outlined some practices that differed from the more commonly accepted ones.

72. Mr Jarkiewicz testified that he might hook on to a lower rosette of the wharf side standard, or of the outside standard (when it is not being dismantled). Similarly he might also hook on to the ledger at his feet. He described these as methods of last resort and whilst undesirable, he might have employed them if the lanyard was not long

[22] ts 253 - 254
[23] ts 201; ts 217
[24] ts 208 – 209; ts 211

enough. He confirmed he would not ever hook on to a brace.[25]

73. Mr Jarkiewicz had experienced occasions where the inertia reel on the lanyard (usually at 1.8 metres) was too short and this might result in him hooking on to a lower rosette so that his movement was not restricted. He believed that increasing the length of the lanyard may be undesirable because it could increase the swing radius in the event that the fall arrest system was deployed.[26]

74. Mr Jarkiewicz explained that if he were dismantling the transom (that the deceased was endeavouring to dismantle) he would be standing on the wharf side ledger with both feet wrapped around the brace. He would be slightly squatting (for stability) and he would hold onto the standard with his left hand. He would hit out the transom wedge with the hammer in his right hand.[27]

75. Mr Willey was a member of the scaffold team on 4 June 2011. He had six to seven years' prior experience and was qualified as an advanced scaffolder. He was familiar with the Layher Allround scaffold system.

76. Mr Willey had received on the job training to the effect that he was not to hook on to anything other than the rosette above him on the standard, and that he was to maintain 100% hook-on at all times by hooking on with both inertia reels on his fall arrest system. He confirmed he adopted this practice.[28]

77. Mr Willey referred to the order in which the scaffold components are to be dismantled. His evidence was that during this process, he would be hooked on to the top rosette on the existing scaffold behind him, as he worked backwards. The rosette would be the one above his head height. In his experience, this hook-on could on occasion be a bit uncomfortable, because when the lanyard was fully stretched (at 1.8 metres) and he bent over to knock out the transom wedge with his hammer, he felt he needed about one more foot in length. However, it did not prevent him from doing his job.[29]

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[25] ts 210 – 212; ts 214
[26] ts 215
[27] ts 207 - 210
[28] ts 10 – 13; ts 23; other witnesses' evidence was that only one lanyard needed to be hooked onto the rosette.
[29] ts 11 - 14

78. On the evidence before me, and particularly from the members of the scaffold team, I am satisfied that the deceased most likely knew that 100% hook-on meant that he needed to keep one safety hook of his lanyard attached to the rosette on the inside standard at all times. However, this practice was not always strictly adhered to. There were instances where scaffolders, as a last resort, may have been inclined to hook on to another part of the scaffold structure.

79. It cannot now be known whether the deceased fully apprehended the extent of the risk he faced if he did not maintain 100% hook-on to the rosette on the standard. However, it is to be borne in mind that the deceased had been observed to be adept at dismantling cantilevered scaffolds. It can safely be inferred that he understood the functions of the various scaffold components and it is highly likely that he was able to discern the components that were load bearing.

EVENTS LEADING TO THE DECEASED'S DEATH

The scaffold collapses under deceased's weight

80. As outlined above, on 4 June 2011 the four-person scaffold team comprised the deceased, Mr Beard as supervisor, and Messrs Jarkiewicz and Willey. Trade assistants Thomas Roubinet and Andrew MacIntyre, employed by Freyssinet Australia, were working on the cathodic protection system and were also in the immediate area.

81. The work process on 4 June 2011 involved the deceased removing scaffold components one at a time and passing them to Mr Beard, who was down under the jetty with the deceased, but standing on the solid platform of the hung scaffold. Mr Beard would take the component passed to him by the deceased, turn away and walk down the northern end of the scaffold to pass the component to Mr Jarkiewicz, who would in turn pass it up to Mr Willey who was waiting on the top of the jetty. Mr Willey would then take the components and place them in the adjacent temporary lay down area.[30]

[30] Exhibit 1, tabs 8 and 31

82. At about 12.00 pm, the deceased was dismantling a section of scaffold near the jetty known as "*dolphin number 6.*" The deceased was removing the handrails, mid rails and floorboards and passing the components to Mr Beard.

83. The deceased then said he would go out onto the remaining scaffold to dismantle the remaining tube structure. Once the floorboards and handrails were removed, the deceased had only the tubular ledgers and end transom to stand on, and only the diagonal braces to hang onto.[31]

84. Self-evidently, this activity was attended by a high degree of risk because the deceased needed to walk along the tubular ledger and use his hammer to hit underneath the connecting ends of the scaffold to dislodge a wedge and separate the tubes.

85. The deceased disconnected the first transom, shore side ledger and shore side standard and passed each separate tube to Mr Beard.[32] For reasons addressed later in this finding, I am satisfied that when the deceased came to disconnect the next transom, it is likely that he attached one or both of his safety hooks to the jetty side ledger and then he traversed this same ledger.

86. Whilst Messrs Beard, Jarkiewicz and Willey were occupied stacking pieces of scaffold they heard a loud noise and a splash. Messrs Beard and Jarkiewicz were able to immediately observe that the deceased was no longer on the scaffold. The part of the scaffold where the deceased was last seen was missing. A brace member was hanging vertically and still attached to the hanging scaffold.

87. Mr Beard and Mr Jarkiewicz both looked down and observed that the deceased was not on the surface of the water. Only a hard hat and ripples were seen on the water. The alarm was raised immediately.

Deceased was weighed down when he fell into water

88. Immediately before his fall, the deceased was wearing full length overalls, hi-leg steel capped boots with laces and side zips, gloves, hard hat, tool belt with three hand tools and, as

[31] Exhibit 1, tab 31
[32] Exhibit 1, tab 14

described above, a full body safety harness with two fall arresters.

89. The Department of Mines and Petroleum's investigation found (and I accept) that the deceased's clothing weighed 1.33 kilograms and his work boots weighed 1.93 kilograms. The deceased was wearing a double pin buckle leather tool belt with two hand socket tools, with a combined weight of 2.38 kilograms. The hammer he used to dislodge the scaffold pins weighed 0.82 kilograms. His full body safety harness with the two fall arresters (being the inertia reels, lanyards and safety hooks) weighed 5.85 kilograms combined.[33]

90. The total weight of the deceased's clothing, boots, tools and personal protective equipment was 12.31 kilograms. The deceased weighed approximately 72 kilograms. His maximum combined weight when he fell into the water was approximately 84 kilograms. All of the items worn by the deceased had negative buoyancy once immersed in water.

91. Once the deceased fell into the water the weight of the safety equipment and tools he was wearing will likely have caused a rapid descent to the seabed.

92. Whilst descending through the water, it appears the deceased zipped open his left boot zip most likely in an attempt to remove his boots. He released his double pin buckle tool belt with the two hand tools attached. He unclipped his right thigh leg harness strap and unclipped the shoulder front strap clip in a clear attempt to remove the harness. However, the upper part of his full body harness was on his body when he was recovered.

93. The deceased was still conscious for a brief time after his fall into the water. Unfortunately, tragically, the deceased was hampered by the weight of the items on his person. It is clear that he had bravely attempted to escape from his safety gear. In the circumstances, given the sheer weight of the gear and its design, I do not consider it likely that such an attempt could have been successful.

94. It is also likely that when the deceased fell into the water, he was still attached (hooked on) by one or both of his safety hooks to part of the sinking scaffold structure, and this

[33] Exhibit 1, tab 8

would also have initially weighed him down. Whilst the deceased's fall arrest system was not attached to the scaffolding components when he was located on the seabed that does not exclude the possibility that the deceased was so attached at the point of his fall.

95. The deceased may have unclipped one or both of his harness fall arrester safety hooks from the scaffold structure whilst underwater. Alternatively, one or both of the two fall arrester safety hooks slid off the open-ended tube members when the scaffold structure collapsed.

96. Subsequent examination by the Department of Mines and Petroleum (that I accept) established that the safety hook easily slid on and off the end of the ledger over the captive wedge assembly. The same applied to the brace.

97. If in fact the deceased had hooked on to the part of the scaffolding structure that fell into the water with him, then he was hooked on to the wrong section of the hanging scaffold. This is explored further in my analysis of the reasons for the collapse and fall.

98. The other possibility is that the deceased was not hooked on to any part of the scaffold structure at all at the point when he fell. He may have clung on tightly to the breakaway structure as it swung through its full natural arc before the ledger fractured and separated from the hanging scaffold, falling into the water. This is less likely, and is also explored further in my analysis of the reasons for the collapse and fall.

Attempts to rescue the deceased

99. Immediately following the deceased's fall into the water at approximately midday on 4 June 2011, Mr Jarkiewicz obtained a Rio Tinto UHF radio and broadcast a "*mayday*" emergency call and he also telephoned the Emergency Management Office.

100. Mr Greg Lane who was on the ship loader at the time of the incident was made aware of the emergency. He jumped into the water and made several attempts to swim down to the deceased. However, he found the depth too deep and he was hampered by a lack of visibility as he did not have a dive

mask. Attempts were made to obtain a mask from one of the berthed bulk carrier ships, without success.

101. At about 12.23 pm a commercial vessel conducting work around the Parker Point loading jetty was contacted and arrived on scene at 12.35 pm. The two crew members on the vessel jumped into the water with a mask and snorkel and attempted to locate the deceased, also without success due to lack of visibility. The Emergency Management Officer attended the jetty and after all immediately available search options were exhausted, directed all persons involved off the jetty pending a Police Search and Investigation.[34]

102. Meanwhile, the West Pilbara Volunteer Marine Rescue vessel and the police vessel were deployed. Senior Constables Geike and Donnelly attended the scene at 2.15 pm. Their efforts failed to locate the deceased.

103. The Water Police Dive Squad in Fremantle was therefore contacted for the purpose of locating and recovering the deceased. They were deployed, arriving at Karratha Airport on board Police Airwing at 8.40 pm.

104. At 10.47 pm on 4 June 2011 Police Divers located the deceased on the seabed below where the scaffold structure had collapsed from the jetty. The depth at the time was 15.7 metres with a visibility of about two metres. The deceased's body was brought to surface that night and transported to Nickol Bay Hospital at Karratha for examination and subsequent identification.

105. The next morning the fallen part of the scaffold structure, the deceased's tools and his tool belt were brought to the surface by Police Divers. The deceased's hammer was located on the seabed separately from the tool belt containing the two other tools. The items were all in close proximity to where the deceased was located.

106. It is clear that the alarm was promptly raised and immediate attempts were made to rescue the deceased. The spontaneous efforts of those who jumped into the water to endeavour to save or locate the deceased in the immediate aftermath are to be commended. Unfortunately, given the depth of the water and lack of visibly, those efforts were unsuccessful.

[34] Exhibit 1, tab 7

ANALYSIS OF REASONS FOR THE COLLAPSE AND FALL

107. When the fallen part of the scaffold structure was brought to the surface, the ledger (jetty side), standard and transom were still attached to each other. Subsequent investigations established that the connection at the end of the ledger (being the horizontal member attached to the vertical member) was damaged, in that the claw was torn.

108. Subsequent mechanical testing arranged by the Department of Mines and Petroleum (that I accept) was able to establish that the claw of the ledger did not fail completely and separate until the ledger had been pulled down though its full arc from the horizontal position to the near vertical. This resulted in a fracture that produced a small metal fragment (namely one half of the ledger's cast claw) that was recovered from the seabed.[35]

109. It raised the question of whether there was a pre-existing defect in the scaffold structure (including the ledger's claw that fractured) that may have contributed to the collapse of the scaffold. It was therefore necessary to explore how the ledger's claw failed.

110. After the collapse of the scaffold structure, the brace (jetty side) with its captive wedge intact was observed to be hanging free from the structure in a near vertical position. This was the brace that provided critical support to the cantilever structure.

111. The deceased was last observed to be standing or sitting on the ledger that separated and fell. I am satisfied that at that point the deceased intended to traverse the ledger and swing his hammer from below in an upward motion towards the structure upon which he was standing or sitting in order to strike the underside wedge connecting the transom to the standard. His purpose was to remove the transom and pass it up to Mr Beard.

112. The pieces of the scaffold structure were connected to the prime member being the vertical standard. The transom, ledger and brace were all connected to a connecting plate (that is, the rosette) with the underside wedges being approximately two inches apart. The transom was the

[35] Exhibit 1, tab 8

wedge on the left, the brace was the middle wedge and ledger was the wedge to the right.

113. At the inquest I heard evidence relating to the deceased's last known movements. Given there was no direct witness to the deceased's fall upon the partial collapse of the scaffold, it was necessary to explore the possible reasons for the occurrence. In pursuance of this purpose, the following categories of evidence were taken:

- evidence of the scaffolders based upon their observations and/or experience with cantilever scaffolds;
- evidence of the Department of Mines and Petroleum Inspectors based upon their investigation; and
- evidence of an independent engineer and an independent scaffolding consultant, based upon their expertise in the relevant areas.

114. The evidence and my conclusions as to the reasons for the collapse and fall are outlined below.

Celtic Scaffolding's evidence

115. Whilst Mr Beausang was not on site when the deceased fell, he became aware that this fall occurred when the deceased was endeavouring to disconnect the transom. Mr Beausang formed the view that the deceased accidentally hit the brace wedge instead of the transom wedge, which caused the collapse of part of the scaffold.

116. At the inquest he testified as to his belief that the deceased would have been endeavouring to hold onto the transom with one hand (given it had been disconnected at the other end) so it would not fall into the water. He agreed that in the attempt to hit out the transom wedge the strike point for the hammer would be unsighted.[36]

117. Mr Beausang believed that a scaffolder adopting the usual process for disconnecting this transom end would have secured the transom with the left hand, leant with the left shoulder against the standard, and with the left side (ribcage) leaning against the brace, used the right arm from

[36] ts 167

around the back of the standard, to tap out the transom wedge.[37]

118. Mr Beausang believed that this would minimise the risk of knocking out the brace wedge. In his experience this scaffold did not require significant force to be used when hammering out the wedges.[38]

The scaffolding team's evidence

119. At the material time, Mr Beard was the supervisor, being the most experienced of the four-person scaffold team. He reported to Rio Tinto. His evidence was that at approximately midday, he and the deceased were removing scaffold under the maintenance bay with about two to two and a half metres of scaffold, working backwards towards jetty position 20E.[39]

120. Mr Beard recalled that the deceased had begun removing the scaffold tubes and passing them on to him. As they were handed to him, Mr Beard in turn passed them on to Mr Jarkiewicz. Mr Beard was standing on the floorboards and he was able to observe the deceased disconnect a transom end on the water side. This was the first step for the disconnection of this transom. It then needed to be disconnected on the jetty side, so that it could be removed and passed on to Mr Beard.

121. Mr Beard last saw the deceased sitting on the ledger closest to the jetty. He did not observe the manner in which the deceased was hooked on. His expectation was that the deceased would proceed to fully disconnect the transom by knocking out the transom wedge on the jetty side. However, he did not see the deceased undertake this function.[40]

122. Mr Beard turned away from the deceased to pass a component on to Mr Jarkiewicz. He did not observe the deceased's fall, but very shortly after he turned away, he heard a loud noise and a splash. He saw the deceased's hardhat on the water and he noticed the brace was hanging

[37] ts 167 - 168
[38] ts 167 - 168
[39] ts 267; Exhibit 1, tab 14
[40] ts 257 – 258; Exhibit 1, tab 14

vertically and the ledger, standard and transom were no longer there. He immediately raised the alarm.[41]

123. At the inquest Mr Beard's evidence was that he believed the deceased had gone to strike the transom out on the jetty side, and he has hit the brace, which has shock-loaded the ledger. Whilst Mr Beard had not observed this type of error to have occurred in the past, he surmised that it can happen with the cantilever scaffold (given that the scaffolder cannot see the wedge that needs to be struck with the hammer).[42]

124. Whilst Mr Beard had only known the deceased for four weeks, he considered him to be a "*10-year veteran*" and well qualified. He had confidence in the deceased's aptitude as a scaffolder. On previous jobs he had observed the deceased hooked on to a rosette in the requisite manner.

125. It was posited that the deceased might have hooked on to the ledger that he was sitting on. Mr Beard had not previously observed the deceased to have hooked himself on to a ledger. Mr Beard testified that if he had observed the deceased hook on to a ledger that he was positioned on, he would have told him to hook on to the rosette. It was clear to Mr Beard that the deceased was not hooked on to the rosette when he fell.[43]

126. At the material time, Mr Jarkiewicz was receiving the dismantled components of the scaffold system from Mr Beard, who was passing them up to him. His role was to stack the components. He recalled he was positioned on the next bay back from where the deceased was working. He was able to observe the deceased from a distance, but not continuously, give his role.[44]

127. Mr Jarkiewicz last saw the deceased disconnecting a transom end on the water side of the scaffold, without difficulty. Then he saw the deceased step over onto the ledger closest to the jetty (being the ledger from which he subsequently fell). At the time he gave his statements in June and September 2011, Mr Jarkiewicz recalled that the deceased was hooked on to this ledger with both hooks. At the inquest however he was unable to recall this detail.[45]

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[41] ts 257 – 258; Exhibit 1, tab 14
[42] ts 258 - 259
[43] ts 257 - 267
[44] ts 219; Exhibit 1, tab 16
[45] ts 219; Exhibit 1, tabs 16 and 17

Self-evidently Mr Jarkiewicz' recollection on this point as at the date of his earlier statements was closer in time to the incident, thereby supporting its reliability.

128. Mr Jarkiewicz did not observe the deceased at work disconnecting the transom end on the jetty side. It is clear that he did not observe the deceased subsequently fall, though he heard a loud noise and a splash.[46] This occurred very shortly after he observed the deceased step over onto that ledger.

129. At the inquest Mr Jarkiewicz' evidence was that he believed the deceased had gone to hit the wedge of the transom, but that he hit the wedge of the brace instead, causing it to become free. In his experience, this is something that could happen.[47]

130. At the material time, Mr Willey was the standby scaffolder, receiving the dismantled components of the scaffold from Mr Jarkiewicz and stacking them on the jetty. He last saw the deceased shortly before he fell, and he recalled him stripping the bay and sitting on the ledger from which he fell. He did not observe whether and if so, how the deceased was hooked on, though he firmly believed the deceased would have been hooked on to something.[48]

131. Like the other witnesses, Mr Willey did not observe the deceased's fall. In his case, he was on the jetty, and least likely to have observed the fall, given that he was occupied with stacking the components. At the inquest Mr Willey's evidence was that he believed that the deceased hit the brace wedge, which shock-loaded the ledger causing it to snap. Alternatively, that he hit the brace wedge and then immediately fell.[49]

132. Mr Willey believed it was "*pretty easy*" to hit the correct wedge (in this case being the transom wedge) and he performed this task fairly regularly on this job.[50]

[46] ts 219 - 223
[47] ts 223 - 224
[48] ts 15 - 16
[49] ts 16
[50] ts 16 - 17

The Department's evidence

133. Mr French is in the employ of the Department of Mines and Petroleum, Resources Safety Division, as a District Inspector of Mines, appointed in accordance with section 17 of the *Mines Safety and Inspection Act* 1994. He completed and signed the Investigation Factual Report on 5 September 2012.[51] He investigated the incident on behalf of the Department of Mines and Petroleum, with Inspectors Figueiredo and Farnworth and he gave evidence at the inquest.

134. Mr French inspected the scaffolding components recovered from the seabed and observed that the failure occurred at the point where the ledger was attached to the rosette on the remaining standard. The piece of claw that had snapped off was able to be recovered from the seabed was examined under electron microscope and fractographs were taken at the Australian Resource Research Centre (CSIRO).

135. It was observed that the cast steel end of the ledger had fractured close to the wedge point. It therefore became necessary to consider whether or not there was a pre-existing defect in the casting that may have contributed to the failure. Accordingly, destructive testing was performed on exemplar ledgers to determine whether the damaged ledger contributed to the collapse, or was as a result of the collapse.[52]

136. In November and December 2011, Mr French attended at premises associated with Metallurgical Testing Services to witness the results of mechanical testing of identical scaffolding components.

137. Six exemplar ledgers and a three metre standard were obtained from the lay down yard at the wharf on East Intercourse Island, Dampier, for testing. The purpose was to establish the load required to cause a fracture in exemplar ledgers when arranged in the same configuration as was believed to be the case shortly before the site incident.[53]

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[51] ts 28 – 29; Exhibit 1, tab 8; at that time Mr French was appointed as a Special Inspector of Mines

[52] Exhibit 1, tab 8

[53] Exhibit 1, tab 8

138. The loads that were applied were calibrated and certified. In Test 6 the weight that was placed on the ledger was 83 kilograms and was positioned 400 millimetres from the end of the ledger. I accept that this was the approximate combined weight of the deceased, and the approximate position where a person would need to be in order to comfortably reach the wedge with hammer in hand.[54]

139. The mechanical test was able to replicate the failure evident on the end of the ledger recovered from the water. Mechanical testing (destructive testing) of exemplar ledgers produced a metal fragment with an identical fracture location to the ledger recovered from the water. This was established when the metal fragment from Test 6 was taken to the CSIRO and the surface of failure was examined under a scanning electron microscope. The images were recorded as fractographs and compared with the fractograph images taken previously when examining the original metal fragment recovered from the sea-bed.[55]

140. I accept that this demonstrates that if the brace was disconnected instead of the transom, the deceased's weight and equipment alone on the ledger was sufficient to collapse the structure.[56]

141. Further, finite element analysis arranged by the Department of Mines and Petroleum and conducted by Curtin University (by computer program) showed that the maximum stress was located at the metal casting on the end of the ledger where it was wedged to the standard (being precisely where the original ledger and test ledgers all failed). This supported the mechanical testing results.[57]

142. At the inquest Mr French testified that as a result of the testing he determined with a degree of certainty that the deceased knocked out the wedge supporting the brace, which was in turn supporting the ledger, which was under tension due to his body weight. When his bodyweight came down on the ledger, it caused the ledger to fall. He was able to exclude a failure of the scaffolding components themselves.[58]

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[54] Exhibit 1, tab 8
[55] Exhibit 1, tab 8
[56] Exhibit 1, tab 8
[57] ts 31; Exhibit 1, tab 8
[58] ts 30 - 31

143. Mr French ascertained that the fall arrest system was not activated and the safety hooks were found not to have failed. He also ascertained that given its diameter, a safety hook could easily pass over the end of a ledger and the end of a brace. Whilst Mr French was able to opine that the deceased was not attached to a rosette on a standard, he could not express a view on whether the deceased had attached himself to the brace or the ledger that fell, because the deceased may have detached himself whilst in the water, in an effort to resurface. Alternatively, the safety hooks may have slid off in the fall.[59]

144. Mr French was confident that if the deceased had been hooked on to the rosette on the standard, when he fell, he would have been captured by his fall arrest system. However, he considered it likely that the deceased would have hooked onto something, and he testified as to the industry standard:

> *"....we look at what's industry standard, and industry standard – you talk to scaffolders from anywhere they talk about 100 per cent hook-on. That's the – even that phrase, that's a phrase that's jargon to that scaffold industry. Hook – 100 per cent hook-on."*[60]

145. Mr Figueiredo is in the employ of the Department of Mines and Petroleum, Resources Safety Division, as a Special Inspector of Mines, appointed in accordance with section 17 of the *Mines Safety and Inspection Act* 1994. He assisted Mr French in the investigation the subject of the Investigation Factual Report dated 5 September 2012.[61]

146. In the course of the investigation, one of Mr Figueiredo's functions was to undertake a demonstration of the attachment and reach of the fall arrest system that would have been available to the deceased if he had been hooked on to the correct rosette on the standard. The purpose was to determine if there was any physical reason why the deceased was not attached to that rosette. The question posited was whether, if correctly attached, the deceased would have had enough length in his fall arrest system to be where he needed to be in order to dismantle the furthermost components.[62]

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[59] ts 32 - 33
[60] ts 34
[61] ts 28 – 29; Exhibit 1, tab 8; at that time Mr French was appointed as a Special Inspector of Mines
[62] Exhibit 1, tab 8

147. For this purpose Mr Figueiredo, with Mr French, attended the location of the evidence sea container on 26 July 2012. Mr Figueiredo put on the fall arrest harness and inertia reels and demonstrated his reach whilst being properly attached on a replicated scaffold structure. Whilst Mr Beard had last seen the deceased sitting on that ledger, Mr Figueiredo undertook his demonstration from a sitting, crouching and standing position, to take account of the possibility that the deceased changed his position.[63]

148. At the inquest Mr Figueiredo gave factual evidence about his demonstration. He also gave opinion evidence. He was qualified to provide his opinion because prior to his employment with the Department of Mines and Petroleum, he had worked as a scaffolder between 1988 and 1998 on various projects including on offshore, commercial and industrial sites. He had worked on cantilevered scaffolds. He had worked on scaffolds over water. I also took account of the fact that he had not previously worked on a cantilevered Layher Allround scaffold system.[64]

149. The inertia reels on the fall arrest system that Mr Figueiredo wore for the demonstration were 1.8 metres long. He hooked on to the rosette on the standard half a metre above the ledger. When he moved so as to knock out the transom wedge (sitting, crouching and standing) he was able to reach it satisfactorily, but the inertia reels were almost fully stretched. At the inquest he agreed that he could not physically see the transom wedge that was to be knocked out.[65]

150. Mr Figueiredo testified that in the course of the demonstration he appreciated "*the danger of the situation*" meaning that, assuming there was water below him, and bearing in mind that the brace wedge was only held in place by the tension in the bracket, any wrong movement (such as inadvertently knocking out the brace wedge) would result in the ledger becoming unsupported. I accepted this as opinion evidence concerning the risks to scaffolders in similar circumstances.[66]

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[63] Exhibit 1, tab 8
[64] ts 74 - 75
[65] ts 82 - 83
[66] ts 82 - 83

151. Mr Figueiredo formed the view that the deceased knocked out the wrong wedge, in that he knocked out the wedge of the brace instead of the wedge of the transom.[67]

152. I accept the submission from the Department of Mines and Petroleum through its counsel that the extensive testing and analysis conducted by the metallurgical engineer and manager investigation services branch, assisted by the CSIRO demonstrated that there were no inherent defects in the scaffold equipment or structure, as built, to explain why the ledger failed, otherwise than by the force of the deceased's weight on the ledger once the wedge was removed. I also accept the deceased's fall arrest system was fully functional and showed no signs of having been deployed.

153. I am satisfied that there was no pre-existing defect in the scaffold components, or structure that contributed to the collapse. In particular I accept that there was no pre-existing defect in the cast steel claw and the end of the ledger recovered from the water.[68]

The independent engineer's evidence

154. Independent engineer Mr Andrew van der Meer provided a report to the coroner in connection with the deceased's death.[69] He is highly qualified in his area and has extensive engineering experience. He graduated from University in 1969, obtained his Masters and first commenced designing scaffold systems for multi-storey buildings in 1973. Since that time he has continuously been involved in the scaffold industry as a consultant. He has erected and designed scaffolds. He is familiar with cantilever scaffolds. He gave evidence at the inquest.

155. Mr van der Meer explained that scaffolds are inherently unstable and that cantilever scaffolds, which have been used for nearly 100 years, are "*the most dangerous engineering structures*". His reason was that if one part gives way, the cantilever fails because you have no redistribution of force. Whereas a beam is supported at two ends, with forces that can go in two directions, a cantilever is a structure that is supported at one end, meaning that all

[67] ts 83 - 84
[68] Exhibit 1, tab 8
[69] Exhibit 1 tab 31

the force goes in one direction. Nonetheless, he testified that this is the first "*cantilever failure*" that he has seen.[70]

156. In Mr van der Meer's opinion:

> *"McBride was performing one of the most dangerous tasks I have ever witnessed in the dismantling operation of a tubular scaffold system because:*
>
> - *The stability of the ledger (ledger) on which McBride was supported relied solely on the proper engagement of a single wedge within the rosette of the layher standard.*
> - *The ledger was being supported at the water end by a tubular diagonal brace (brace) and the weight of McBride, his tools and other scaffold components ensured that the brace was being subjected to a significant tensile force.*
> - *Any dislodgement of the brace wedge would have resulted in a sudden rotation and collapse of the ledger. The Wedge to rosette connection at the top end of the brace was not capable of providing the required rotational support in the event of the lower brace wedge being disengaged.*
> - *Therefore there was no backup system in place to provide ledger support in the event of brace wedge disengagement."*[71]

157. Mr van der Meer noted there is a tensile force in the brace that results in a vertical upward force being applied to the wedge through frictional interaction. Any movement of the deceased's body on the scaffold would have resulted in significant lateral movement of the ledger on which he was sitting. He posited that the consequential application of vibratory disturbance to the rosette joint can result in upward migration of the brace wedge under the action of this vertical force leading to disengagement with the rosette. At the inquest he explained: "*....the wedge under certain loading conditions wants to pop out of the joint....*"[72]

158. Mr van der Meer considered whether the brace wedge came loose without the deceased hitting it, but in light of his experience considered it more probable that the deceased struck the brace wedge by accident. He took into account the fact that as the deceased was endeavouring to remove the transom, and attempting therefore to dislodge the transom wedge with an upward blow with his hammer, he

[70] ts 274
[71] Exhibit 1, tab 31
[72] ts 277; Exhibit 1, tab 31

would not have had an unobstructed view of his hammer target. The transom wedge was in close proximity to the brace wedge.[73]

159. Mr van der Meer opined that, had the deceased been hooked on to the rosette on the standard at the other end of the scaffold, his fall arrest system would have been capable of arresting his fall into the water. He did however sound a note of caution, in that there would have been a risk of him being injured as his body swung because he would have been on a radius: "*....normally when you hook on to something you want a vertical fall, you want to make sure you fall vertically so your harness behind you catches you. If you have to rotate and fall, the rotating body could strike something else....*"[74]

The independent scaffolder's evidence

160. The independent scaffolding consultant Mr Crawford prepared a report and gave evidence at the inquest regarding the cantilevered scaffold system. Mr Crawford has extensive experience in this area, having obtained his Bachelor of Engineering in Civil Engineering in 1962, and being a principal of a consultancy to scaffolding and formwork segments of the construction industry since 1996. His role has involved inspecting installations and assisting industry in compliance with Australian Standards.[75]

161. Mr Crawford opined that it is reasonable to assume that the deceased was endeavouring to loosen the wedge securing a transom such that it could be removed, following which he would move back to the next inboard standard. It could also be assumed that he had already unsecured the other end of the transom connected to the opposite standard.[76]

162. Mr Crawford pointed to some unique features of the scaffold that the deceased was dismantling. It was a cantilevered scaffold where the outlying standard was being retained in position by a brace and a ledger. An "*unusual feature*" was that the braces were fitted to the insides of the standards. As a consequence, the ledger, brace and transom were all connected at the same level and in the same quadrant of the

[73] ts 282 – 283; Exhibit 1, tab 31
[74] ts 292 - 293
[75] Exhibit 1, tab 32
[76] Exhibit 1, tab 32

rosette, with the brace wedge being immediately adjacent to the transom wedge.[77]

163. Having regard to the deceased not being able to see the ends of the wedges as he was knocking them out, Mr Crawford extrapolates that in endeavouring to loosen the transom wedge, the deceased struck all wedges at the same time: "*With Mr McBride's weight at that location and possibly a hard hammer blow, all the wedges would have sprung out of their slots in the rosette resulting in all of Mr McBride's weight being supported by the ledger which in turn broke at connection to the next inboard standard.*"[78]

The reasons for the collapse and fall

164. On all of the evidence before me I am satisfied that the deceased had intended to strike the underside wedge connecting the transom to the standard (left wedge). Unfortunately however, the deceased appears to have struck the middle wedge of the brace, being the major load-bearing member of the structure.

165. Once this brace wedge was dislodged the deceased's entire weight was placed on the ledger connected to the remaining scaffold. Without the support of the brace, the ledger connection has given way under the weight of the deceased. Once the brace was disconnected, the deceased's weight and equipment alone was sufficient to collapse the structure.

166. The ledger was originally attached horizontally at 2.6 metres above the ground surface. As the ledger swung down though its natural arc, the ledger's claw tore off from the standard. As a result, the transom, standard and ledger that the deceased was traversing fell into the water.

167. Whilst this addresses the scaffold's collapse, it does not account for the deceased's fall into the water, given that he was wearing a fall arrest system.

168. The evidence before me does not conclusively establish that the deceased was attached to a part of the scaffold structure that collapsed. He may have maintained 100% hook-on, but

[77] Exhibit 1, tab 32
[78] Exhibit 1, tab 32

to the wrong component, or he may not have been attached at all at the moment of collapse.

169. The most likely explanation is that when the deceased was traversing the scaffold members to be dismantled, he harnessed one or both of his fall arrester safety hooks to the ledger that he was either standing or sitting on when it collapsed and also fell into the water. The safety hooks then likely slid off, or he managed to detach them once he was in the water.

170. Given the deceased's experience as a scaffolder (and therefore his awareness of potential risks) it is possible, but unlikely, that he chose to traverse the ledger without being hooked on to anything at all.

171. The tenor of the witnesses' evidence at the inquest was that they all knew to hook on to the rosette on the standard. I am satisfied that the deceased most likely knew this to be the appropriate procedure, but I am not satisfied that he apprehended the extent of the risk he faced by not hooking on to this rosette.

172. Given the deceased's experience it is unlikely that the deceased knew it was a positive requirement to hook on to the rosette on the standard for his own safety and nonetheless deliberately chose not to do so.

173. The evidence does establish that unfortunately when the scaffold collapsed the deceased was not hooked on to the rosette on the standard. He was clearly not attached to a fixed point on the jetty itself either.

CAUSE AND MANNER OF DEATH

174. The forensic pathologist, Dr Jodi White, made a post mortem examination on the body of the deceased at the State Mortuary on 9 June 2011. The examination showed heavy fluid laden lungs with bilateral pleural effusions and frothy fluid in the airway.

175. There were no relevant injuries. The deceased was wearing a standard hard hat. There is nothing to suggest that the deceased hit his head and lost consciousness upon entering the water. There was no evidence of a head injury.

176. There was no external evidence of recent injury to the bones of the limbs. The skull, rib cage, vertebral column and pelvis showed no fracture. There was no bruising to the soft tissues of the anterior chest or abdominal walls.

177. I am satisfied that the deceased was conscious for a short time after he entered the water.

178. Toxicological analysis was ordered. No alcohol or common drugs were detected.

179. On 9 June 2011 Dr White formed the opinion that the cause of death was consistent with drowning, pending further information and toxicology. After further consideration Dr White confirmed that in her opinion the cause of death was drowning.

180. I accept and adopt Dr White's opinion as my finding on the cause of death.

181. On the evidence before me I am satisfied that in the course of working on the dismantling of the scaffold equipment the deceased made an error and inadvertently knocked out the brace wedge from the rosette, instead of the transom wedge, whilst using his hammer. The force of his weight upon the ledger, once the brace wedge was removed, caused it to fail. His fall arrest system was not deployed. As a result, the deceased fell approximately 4.8 metres into water that was approximately 16.8 metres deep and he did not re-surface.

182. I find that the manner of the deceased's death was by way of Accident.

WAS THE DECEASED'S DEATH PREVENTABLE?

183. The deceased's fall arrest system was not deployed because he did not attach it to any of the vacant slots on the rosette on the end standard on the hanging scaffold. The standard on the end of the hanging scaffold remained intact following the collapse. Had he been attached to that point, following his fall he would have been suspended in his fall arrest harness under the hanging scaffold. The personal fall limiters are designed to absorb some of the energy of the fall and reduce the impact on the wearer whilst arresting the fall.

184. Had the deceased been hooked onto the rosette on the end standard on the hanging scaffold, he would have had enough length in his attachment to traverse the ledger and to lean over and knock out the transom wedge with his hammer. He would have been able to do this from a sitting, crouching or standing position. The inertia reels were able to stretch for this purpose. There was no physical impediment to reaching the transom wedge with the hammer, if hypothetically, the deceased had been attached to the correct rosette.[79]

185. I am satisfied that if the deceased had adopted the 100% hook-on procedure, and if he had attached at least one of his safety hooks on to the rosette on the end standard on the hanging scaffold, his death would most likely have been prevented.

186. However, that is not the end of the matter. It is to be borne in mind that the deceased was undertaking high-risk work. Two experienced witnesses regarded it as dangerous work. He was dismantling a hung scaffold at height. It was a technical procedure, reliant upon the scaffolder knowing precisely the order in which the components were to be removed.

187. The wedges were close together and the correct one needed to be dislodged in circumstances where the scaffolder could not see the hammer strike it. The scaffolder was therefore required to accurately estimate its location.

188. The deceased had already removed the handrails, mid rails and floorboards. Accordingly, at the material time, there was no floor surface for him to stand on and no handrail for him to hold onto. He had only the tubular ledger to stand on and only the diagonal brace to hold onto. This underpins the risk he was facing.

189. The added risk was that the deceased was working over water and weighed down by approximately 12 kilograms of equipment. Whilst the deceased's fall arrest system was fully functional, its efficacy was reliant upon him knowing where to hook on, and complying with that procedure.

190. In all of the circumstances, I am satisfied that the nature of the deceased's work was such that a momentary distraction

[79] Exhibit 1, tab 8

or lapse in concentration could potentially have dire consequences.

191. Accordingly, whilst it is likely that the deceased's death was preventable if he had hooked on to the correct attachment point, given the inherent risks that he faced, it was important to explore other modes of prevention.

The pin lock system

192. After the deceased's death Celtic Scaffolding developed a modification to the scaffold structure with the aim of preventing a scaffolder from inadvertently knocking out the wrong wedge on a critical brace in a cantilevered scaffold. They are to be commended for attempting to look for potential solutions in order to minimise this risk.

193. The modification involved a pin lock system for wedges on critical braces. It was achieved by drilling a three to four millimetre hole into the relevant wedge, for the insertion of a split ring pin. The hole is drilled near the end of the wedge and adjacent to a rivet that is fitted to tall wedges to prevent inadvertent falling out during handling of the component during erection and/or dismantling.

194. Mr Beausang testified that Celtic Scaffolding has been using the pin lock system for the last four and a half years on their cantilevered scaffolds. He outlined the testing they undertook to establish to their satisfaction that the pin could not be hammered out accidentally. He explained that "*crowding*" is not likely to be a problem because their eight hole rosettes would have a maximum of two brace wedges.[80]

195. The scaffolders who gave evidence at the inquest were questioned as to their experiences with the pin lock system. Messrs Beard and Willey have used the system and were supportive. Mr Beard observed he has had no trouble using the pins, none have become deformed by hammering or unworkable. Mr Willey believed that it would stop a wedge from a brace being accidentally removed or hit out because the scaffolder has to take the pin out before the wedge can be taken out.

[80] ts 170 - 171; Exhibit 1, tab 34

196. Mr Jarkiewicz has not used the pin lock system. He testified that in subsequent scaffolding work, he has placed a scaffolding clamp on top of the brace wedge so that it could not be accidentally hit out. He was supportive of the pin lock system because he believed it would obviate the need for the application of the scaffolding clamp.[81]

197. The Department of Mines and Petroleum investigators who gave evidence at the inquest were supportive of the pin lock system as a concept, noting that they did not formally investigate its usage. Mr French considered it would assist in avoiding the inadvertent knocking out of a critical brace wedge. He suggested that given the size of some scaffold structures, it may be apposite to identify the critical braces (those under compression or tension) and apply the pin lock to those. Mr Figueiredo's evidence was to similar effect.[82]

198. In the experience of the independent engineer Mr van der Meer, the unintentional removal of a wedge securing a supporting brace is an event that does occur frequently in the scaffolding industry. He opined that the pin lock system would have prevented the unintentional removal of a wedge securing a supporting brace. However, he would not recommend the pin lock system and he outlined the following reasons:

- The pins would be difficult to view from above and therefore their certainty of engagement would be uncertain;
- The pins could clash with pins in adjacent wedges, though in evidence he accepted "*crowding*" would not be an issue;
- The pins could get damaged if struck from below by a hammer and become difficult to remove; in evidence he referred to various methods of addressing this issue;
- The use of pins to all wedge lock scaffold system components would greatly increase the erection and dismantling time for scaffold systems;
- Any significant drifting or upward migration of the wedge could cause the pin to become trapped against the claw and thus more difficult to remove.[83]

199. Mr van der Meer's main concern related to the fact that the scaffolder cannot see the pin that is locking the wedge:

[81] ts 19; ts 227 – 228; ts 259
[82] ts 47 – 48; ts 84 - 85
[83] ts 284 – 285; Exhibit 1, tab 31

"*....the pin has to go in from underneath and you've got less wedge area to get it into, and you can't see if it's in place....*"[84]

200. Mr van der Meer did however support the development of a wedge lock system for the safe engagement of wedges for diagonal brace members. In his opinion they should be locked into place using a clearly visible and easy to engage locking mechanism that is strong and durable enough to resist the repeated significant forces applied during erection and dismantling.[85]

201. The independent scaffolding consultant Mr Crawford opined that the pin lock system would serve the purpose of preventing the unintentional loosening of a wedge. In evidence he said it would be a useful device, though he noted that it would only apply to a rosette system. Having regard to his evidence, referred to earlier, about the uniqueness of the scaffold that the deceased was dismantling, he did not consider that that arrangement is likely to be replicated. He considered that a pin lock system could be used on rosette type scaffolds in very specific cases where the brace is used as a primary structural member.[86]

202. The managing director of Layher, the manufacturer of the Layer Allround scaffold system did not support the pin lock system. The primary concern related to the fact that every brace on a scaffolding structure is under a tension or compression load, and is therefore a "*critical brace*". As a consequence it would follow that every wedge on every brace would have to be fitted with pin locks. Some potential problems were noted, as follows:

- the introduction of a non-captive system such as a pin lock immediately introduces the risk of falling objects; irrespective of the size of any such object, this risk is taken very seriously on both commercial and industrial sites in Australia;
- invariably, there is a requirement for scaffolders in Australia to wear gloves; handling small pins with gloved hands is difficult and introduces the likelihood that an object may be dropped;
- in many cases, brace wedges will be located below deck level; to either insert or remove a pin lock will then

[84] ts 284 - 285
[85] ts 284 – 286; Exhibit 1, tab 31
[86] Exhibit 1, tab 32

increase the frequency when a scaffolder may be required to lean over an exposed edge of a scaffold.[87]

203. Layher's managing director pointed to the need for scaffolders to be appropriately trained, qualified and experienced, and for task planning to be undertaken in association with manufacturer's guidance information, along with an analysis of the risks associated with each job as identified in a Job Hazard Analysis and Work Method. Whilst Layer accepts the potential for any concept to be incorporated into any scaffold system, it concluded that no changes to Layher Allround components were required.

204. The arrangement of the scaffold that the deceased was dismantling was unusual in that the braces were fitted to the insides of the standards. Ordinarily the braces are fitted on the outside of the bay, which would minimise the risk of the scaffolder inadvertently knocking out the brace wedge. On this occasion, the brace could not be fitted to the outside of the bay due to its proximity to the jetty.[88]

205. In connection with the pin lock system, the Department of Mines and Petroleum through its counsel, submits to me that in the scaffolding industry best practice to avoid falls from height is to install suitable fall injury prevention systems, and ensure workers use systems correctly, with the provision of adequate training and supervision.

206. I accept the submission of counsel assisting to the effect that the evidence does not support a recommendation in connection with a specific design change to scaffolding.

207. Nonetheless it is self-evident that there is potential for changes to scaffold design to minimise risk to scaffolders. It is an evolving area and I encourage ongoing consideration and discussion amongst those with expertise in the area, as part of a process of continual improvement.

Personal Floatation Devices

208. Whilst with the benefit of hindsight it appears to be clear that the deceased ought to have been wearing a personal

[87] Exhibit 1, tab 54.1
[88] ts 224 – 225; Exhibit 1, tab 32

floatation device (PFD) care must be taken to understand the circumstances at the material time.

209. At the material time, it was not industry practice for scaffolders in the deceased's position to wear PFD's when working over water. This is another area of safety that has been developing in light of experience and improved design for PFD's.

210. At the inquest I heard evidence concerning the changes in industry practice, and the practicalities surrounding the wearing of PFD's by scaffolders working over water.

211. The independent expert scaffolder Mr Crawford noted that wearing personal floatation equipment of itself will not prevent a fall but will only work after a fall, which should not occur in the first instance.[89] I accept that all proper and reasonable measures ought to be implemented to avoid falls. Unfortunately however, falls remain a risk.

212. By being hooked on to the scaffold that is being dismantled (as opposed to a fixed point such as the jetty) a scaffold worker in the position of the deceased was reliant on the structural integrity of the scaffold being dismantled, as well as the functionality of the fall arrest system. On the other hand, hooking on to the jetty structure would require an analysis of the load bearing capacity of that attachment point.

213. I have already found that there was no pre-existing defect in the scaffold structure that may have contributed to the collapse, and that the deceased's fall arrest system was in good condition and fully functional.

214. The circumstances surrounding the deceased's death go to show the importance of training, compliance with Job Hazard Analysis procedures, supervision, structural integrity of the scaffold, and proper engagement of the fall arrest system at all times when the scaffolder is working over water.

[89] Exhibit 1, tab 32

215. The independent engineer Mr Van Der Meer highlighted the risks faced by the deceased:

> "*Mr McBride's safety relied entirely upon his fall arrest system and him removing each component of the cantilevered platform in a critical sequence. At this point of deconstruction the sequence of removal is critical. Any deviation from this sequence could result in the remaining part of the cantilever becoming unsupported and Mr McBride's working platform giving way under his own weight and the weight of the unsupported three remaining components.*"[90]

216. Whilst I have found it unlikely in the deceased's case, it is nonetheless possible that a worker in his position would dismiss the risk of falling for the sake of more quickly traversing the ledger without the reach being affected by the attachment to the rosette on the standard. This would be reckless, but its occurrence is not inconceivable.

217. The deceased was not wearing a PFD, nor was any other member of the scaffold team on the jetty. They were not provided with PFD's. It was not the practice for scaffolders to wear PFD's when working over water at Rio Tinto's operations at the East Intercourse Island jetty at that time. It was considered that the fall arrest system would negate the need for a PFD.[91]

218. Shortly after the deceased's death and as a safety response, on 24 June 2011 the State Mining Engineer issued a Mines Safety Significant Incident Report (SIR). An SIR is issued in response to dangerous and fatal incidents or concerning trends. The purpose is to promptly alert employers and workers of dangerous situations that may require remediation at their sites. SIR No. 171 referred to the expectation that scaffold work will be planned and risk assessed, with reference to applicable Australian Standards and manufacturer's specifications; that workers will wear PFD's when working over water; and suitable fall injury prevention systems will be installed and used correctly with adequate training and supervision.[92]

219. Rio Tinto issued written procedures for working over/near water (version 1 dated 7 June 2012 was before me in evidence) that required the wearing of a PFD in

[90] Exhibit 1, tab 31
[91] Exhibit 1, tab 8
[92] Exhibit 1, tab 28

circumstances similar to those of the deceased.[93] The procedures are aimed at ensuring work is carried out safely and include the following:

- A minimum of two personnel within sight and sound of each other must be used where there is a risk of personnel falling into water;
- When performing work, personnel shall be provided with constant access to a rescue boat, at the location of the work;
- A life ring will be available not more than 25 metres from the work location;
- Environmental conditions such as wind, seas, swell and tide must be considered prior to commencement of work;
- Where personnel are erecting scaffold and working in a position where there is a possibility of a fall they must use the hierarchy of control to minimise the risk. If they identify the wearing of working with heights personal protection equipment as the only practical method of controlling the risk they must choose working with heights systems that are in line with RTIO working with heights training and where a suitable overhead anchor exists (or can be built) the use of this in conjunction with a retractable lanyard is the preferred option;
- At no time shall a person be connected to the scaffold bay that is being built or dismantled;
- Where personnel are working with an elevating work platform over water, a harness with a built in Personal Floatation Device (PFD) shall be worn, the harness will be attached to the elevating work platform with a hydrostatic release mechanism that will release automatically should the elevating work platform fail and land in water.

220. If the deceased had been wearing an appropriate self-inflating PFD, there is a reasonable prospect that after falling into the water he would have quickly surfaced, or if he was hooked on to the scaffold, after unhooking from it. Under such circumstances, it is likely that he would not have drowned. It is therefore likely that his death was also preventable if he had been wearing an appropriate PFD.

[93] Exhibit 1, tab 47

221. In 2014 Mr French undertook some research to ascertain whether or not it was mining industry practice to require employees to wear PFD's when attached to fall arrest systems over water. In order to so, he conducted a brief industry survey of port operations in Western Australia that handle minerals and that therefore come within the ambit of the *Mines Safety and Inspection Act* 1994 (the Mines Safety Act). At the inquest he testified that the outcome of his research was that as at 2014 it was not mining industry practice to require employees to use PFD's when attached to a fall arrest system over water, during onshore operations.[94]

222. At the inquest, Mr French also gave evidence about his awareness that this area of workplace safety has been, in effect, developing in the mining industry. Over time, he has observed a number of industry entities adopting working over (or near) water policies that include the requirement to wear PFD's.[95]

223. Modern PFDs are compact and lightweight and can be comfortably worn in conjunction with, and separate to a full body fall arrest system. At the inquest I also received evidence about a floatation harness. This type of fall arrest system integrates the fall protection harness with the PFD to provide buoyancy. In the event of a fall into water, due to a failure of the fall arrest system (for whatever reason) the PFD transforms from its compact folded state into a buoyancy device, which is designed to turn the body the right way up so that mouth and nose are above the water's surface.[96]

224. A range of options are available. Some PFD's inflate automatically, by operation of water pressure; others require the wearer to pull a ripcord. One of the PFD units was designed to bring 150 kilograms of weight from below the water to the surface. A full exploration of all of the available options was outside the scope of the inquest.[97]

225. At the inquest the witnesses were asked questions for the purpose of eliciting information about the practicalities of wearing a PFD whilst undertaking scaffolding work. The scaffolders, Messrs Beard, Jarkiewicz and Willey were supportive of PFD's from a practical perspective when performing scaffolding work. They were all supportive of a

[94] ts 43 – 44; Exhibit 1, tab 29
[95] ts 43 - 44
[96] Exhibit 1, tabs 8 and 33
[97] ts 140 - 141

recommendation addressing the use of PFD's by scaffolders when working over water.

226. Mr Beard has worked on scaffolds wearing a PFD designed to be inflated by the pulling of a ripcord. The PFD was worn together with a full body harness (it was not the integrated unit). It did not unduly restrict his movement. He outlined instances where, due to the nature of scaffolding work, a PFD has become damaged and worn. In his experience, damaged items have been replaced. He saw no difficulty with wearing a PFD, stating: "*....a scaffolder over water should wear one.*"[98]

227. In the past Mr Jarkiewicz has worked on scaffolds over water wearing either a self-inflating PFD or a full body harness. He did not recall wearing both. He has not worn the integrated unit. He inclined towards wearing a PFD subject to its bulkiness. His preference was for it to be the same size roughly as a regular harness.[99]

228. Mr Willey has continued to work as a scaffolder over water, wearing either a PFD alone, or in addition to a harness depending on the practices at the relevant workplace. He has not worn the integrated unit. In his experience, wearing a PFD and separately, a harness, can get a bit uncomfortable. Like Mr Jarkiewicz he inclines towards wearing a PFD. He has witnessed an accidental inflation of a PFD in the past, when the ripcord was inadvertently pulled or caught onto something, but he has not observed PFD's becoming unduly damaged through scaffolding work.[100]

229. Mr Beausang has worn an integrated fall protection harness with a PFD himself. He has noted the potential for them to become damaged due to the scaffolder needing to carry components with sharp or serrated edges. He considered them to be comfortable to wear. Scaffolders undertaking work for Celtic Scaffolding over water are now required to wear the integrated harness and PFD.[101]

230. The provisions of the *Occupational Safety and Health Act* 1984 do not apply to or in relation to deceased's workplace. He was carrying put work on a mine site and his workplace was subject to the provisions of the Mines Safety Act. There

[98] ts 260 - 261
[99] ts 229 - 230
[100] ts 20 - 22
[101] ts 175 - 176

is no specific legislation or regulation that requires scaffolders to wear PFD's when working over water on a mine site under the Mines Safety Act.

231. In evidence Mr French of the Department of Mines and Petroleum opined that prescriptive regulations on this point would be a "*step backwards*" and that a preferred outcome is to move towards a code of practice or recommendation to industry. He inclined towards an approach based upon identifying and assessing risks. Messrs French and Figueiredo were both supportive of scaffolders wearing PFD's over water.[102]

232. In evidence the independent expert scaffolding consultant Mr Crawford as chair of committee BD/36 – responsible for scaffolding standards, Standards Australia, expressed his support for the consideration of an amendment to the Australian/New Zealand Guidelines for scaffolding (AS/NZS 4576:1995) to address the wearing of PFD's by scaffolders in order to mitigate the risks of a fall into water.[103]

233. It is noted by way of comparison that regulation 3.31 of the *Occupational Safety and Health Regulations* 1996 (that does not apply to the deceased's workplace) only addresses the wearing of a PFD if a person is working "*alone*" over water or other liquid and there is a risk of the person drowning if he or she falls into the water or other liquid. Mr French submitted that at the time these regulations were written PFD's were cumbersome life jackets that were very restrictive when worn in conjunction with a full body harness associated with a fall arrest system.[104]

234. Endorsing Mr French's evidence, the Department of Mines and Petroleum, through its counsel submits to me that it has been recognised that a purely prescriptive workplace safety management is not the best approach. Specifically, the Department submits that it is preferable to regulate safety management to develop a culture of evidence-based planning and risk identification, to encourage ownership of flexible, intelligent responses to identify and eliminate risk.

235. The Department of Mines and Petroleum and the State Mining Engineer, through their counsel, support a recommendation to the effect that consideration be given by

[102] ts 45 – 46; ts 92 - 93
[103] ts 130 – 131; Exhibit 1, tab 51
[104] Exhibit 1, tab 30

the relevant Australian Standards committees to the making of amendments regarding the wearing of an approved PFD while working over or adjacent to water, where there is a risk of falling and drowning.

236. I have determined to make a recommendation to this effect to avoid deaths arising in similar circumstances. Whilst the various witnesses were more specifically supportive of the integrated harness and PFD, in making my recommendation I do not prescribe the type of PFD to be utilised by persons working over water, and whether or not it ought to be integrated with the fall arrest harness.

237. The recommendation below concerns amendments to the Australian Standards for Industrial fall-arrest systems and devices (AS/NZS 1891.4:2009) and the Australian Standards for Guidelines for Scaffolding (AS/NZS 4576:1995).

RECOMMENDATION

I recommend that the committees responsible for the relevant Australian Standards consider amendments to ensure that people working over or adjacent to water or liquid who may be at risk of falling into the water and drowning wear an approved PFD – including AS/NZS 1891.4:2009 (committee SF-015 and AS/NZS 4576:1995 (committee BD-36)

238. The Department of Mines and Petroleum through its counsel informs me that its Resources Safety Division publishes "*Resources Safety Matters*" (RSM) a quarterly magazine for the resources industry. About 6000 printed copies are distributed freely to managers, service companies, mine safety and health representatives, and subscribers across all facets of the resources industry. It is also freely available and published on Department's website.

239. The Department informs me of its intention to publish an article in RSM magazine alerting the resources industry to key findings and any recommendations made. I am satisfied that this would serve to assist in drawing attention to the risks faced by persons working over water on mine sites.

CONCLUSION

240. The deceased was a young man who tragically lost his life at his workplace when the scaffold that he was dismantling gave way under him, resulting in his fall into water, from which he did not resurface.

241. There was no material or equipment failure that caused the deceased to fall into the water. The partial collapse of the scaffold was most likely caused by the deceased inadvertently knocking out the brace wedge from the rosette, instead of the transom wedge. When the brace became disconnected from the ledger, the ledger was unsupported and gave way under the deceased's weight.

242. Unfortunately the deceased had not hooked his fall arrest system on to the correct load-bearing attachment point, and as a result, his fall was not arrested. The weight of his safety gear and equipment contributed to a rapid descent to the seabed.

243. Immediate and desperate attempts were made to try and rescue the deceased, but due to the depth of the water and lack of visibility under water, he was unable to be saved.

244. The deceased was engaged in high risk work and the safety measures available to him did not unfortunately prevent his death.

245. His death was a deep shock and remains a tragic and lasting loss to his family. His employer and colleagues were deeply affected. I have no doubt that lessons have been learned from the circumstances surrounding the deceased's death. Some changes to practices have been made in some areas, but there is room for improvement at a more general level.

246. It is my hope that this inquest has highlighted risks to persons working over water, particularly when they are weighed down with items such as tools and safety gear and that my recommendation serves to avoid deaths arising in similar circumstances in the scaffolding industry, or more generally by ensuring that people working over or adjacent to water wear an approved PFD.

R V C FOGLIANI
STATE CORONER
30 May 2017