



Western

Australia

RECORD OF INVESTIGATION INTO DEATH

Ref No: 47/16

I, *Barry Paul King*, Coroner, having investigated the suspected death of **Robert Stephan Hamiora Serjeant** with an inquest held at **Perth Coroner's Court** on **5 December 2016**, find that the identity of the deceased person was **Robert Stephan Hamiora Serjeant** and that death occurred on **13 July 2011** at **Pelago Construction Site on Crane Circle in Karratha** from **multiple injuries** in the following circumstances:

Counsel Appearing:

Mr J T Bishop assisting the Coroner

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INTRODUCTION

1. Robert Stephan Hamiora Serjeant (**the deceased**) was an experienced and qualified rigger who was killed when a concrete soakwell lid being lifted by a crane fell on him and caused him non-survivable injuries.
2. On 25 June 2012 WorkSafe sent the State Coroner a copy of a report by one of its senior inspectors, John Ebert, following his investigation into the circumstances of the deceased's death.
3. Mr Ebert found that a cause of the soakwell falling was the fact that the equipment used to attach the soakwell lid to the crane cable, namely lifting clutches and anchor pins, was inappropriate. The equipment did not comply with the National Code of Practice for Precast, Tilt-up and Concrete Elements in Building Construction (**National Code of Practice**), but it was not required to so comply because it was understood that the National Code of Practice did not apply to civil construction works, to which the soakwell related.
4. Mr Ebert recommended that the National Code of Practice be amended to apply to the manufacture and use of all pre-cast concrete elements, not only those in building construction.
5. On 13 August 2012 Coroner Mulligan noted that the National Code of Practice had not yet been amended. He directed that an inquest be held to inquire into why Mr Ebert's recommendation was not being effected.
6. Regrettably, there was considerable delay in preparing for an inquest.
7. On 3 June 2016 the planned inquest was the subject of a call-over, at which time the inquest was listed to be held on 5 December 2016.
8. On 5 December 2016 I held an inquest at the Perth Coroner's Court. The focus of the evidence was on the

technical cause of the failure of the lift and the potential for amendments to the National Code of Practice or to the relevant Australian Standard, with a view to reducing the likelihood of death or injury occurring again in similar circumstances.

9. Only one witness, Rod Mackay Sim, a materials engineer with expertise in precast concrete components and the design and application of lifting devices for such components, was called to give oral evidence.¹
10. The documentary evidence adduced at the inquest comprised a brief of evidence containing witness statements, technical specifications, expert opinions and Australian Standard AS 3850:2015.²

THE DECEASED

11. The deceased lived in Waikiki with his wife and their three children. He had been diagnosed with type 2 diabetes in August 2010 but, apart from that, it seems that he was reasonably fit and well.³
12. At the time of his death the deceased had been working for four months on a fly-in, fly-out basis at the Pelago apartment construction site on Crane Circle in Karratha (**the construction site**).⁴ He was employed as a crane operator/sub-contractor.⁵
13. The deceased had worked in the construction industry for 25 years. As well as being a qualified crane operator, he had an advanced rigger's licence and a licence to perform high risk work. He had undergone a course in tilt-up panel construction safety and had a construction safety awareness card.⁶

¹ ts 5 – 36 per Mackay Sim, R

² Exhibit 1

³ Exhibit 1, Tab 16

⁴ Exhibit 1, Tab 16

⁵ Exhibit 1, Tab 8

⁶ Exhibit 1, Tab 8

EVENTS LEADING UP TO THE DEATH

14. At 7.00 am on the morning of 13 July 2011 the deceased commenced his working day at the construction site. His role that day was to drive a truck to move panels from one area of the site to another.⁷
15. At about 11.00 am the deceased was working with his supervisor and a crane operator. They were planning to move two 800 kg concrete soakwell lids from the ground onto a flatbed truck about 20 metres away.
16. The deceased attached lifting clutches to the two anchor pins embedded in a soakwell lid and signalled the crane operator by hand that it was ready to be lifted. The crane operator raised it about two metres above the ground. The deceased held onto a five metre long tag line that was attached to the soakwell lid.⁸
17. As the crane operator slewed the load to the left towards the flatbed truck, the soakwell lid flipped and fell onto the deceased.⁹ The deceased put his arm up and attempted to move out of the way but did not have an opportunity to do so.¹⁰
18. The supervisor went over to the deceased, checked his pulse and found none. Ambulance paramedics attended but the deceased was clearly dead.¹¹

ANCHOR PIN AND LIFTING CLUTCH SYSTEM

19. The system used by the deceased to attach the crane hooks to the soakwell lid is widespread in the construction industry in Australia.¹² It has two basic components: steel flange-headed anchor pins that are

⁷ Exhibit 1, Tab 11

⁸ Exhibit 1, Tab 14

⁹ Exhibit 1, Tab 14

¹⁰ Exhibit 1, Tab 12

¹¹ Exhibit 1, Tabs 3 and 12

¹² ts 15 per Mackay Sim, R

embedded in the concrete component, and matching slotted steel lifting clutches which fit over the anchor pins and under the anchor pins' heads to enable the component to be lifted by the anchor pin heads. Part of the clutch assembly is a high strength bail which can be attached to a crane hook.¹³

20. Components of this system are available in different sizes, based on load capacities. The sizes used by the deceased's employer were 1.3 tonne, 2.5 tonne and 5 tonne. An important safety aspect of the system is that each size of anchor pin fits only the corresponding size of clutch, so that a 1.3 tonne clutch can fit only the 1.3 tonne anchor pin, and so on.
21. The means of ensuring that correct lifting components match each other partly involves imbedding the anchor pins in semi-spherical recesses which are formed to specified tolerances to fit the appropriate sized clutch. For example, the 2.5 tonne clutch is larger than the 1.3 tonne clutch, so it will not fit into the recess containing a 1.3 tonne anchor pin, provided the components accord with the specifications.
22. In addition, the diameter of the shaft of the 2.5 tonne anchor pin should be too large to accommodate a 1.3 tonne clutch and a 5 tonne pin should not accommodate a 2.5 tonne clutch.¹⁴
23. However, if the lifting components are not manufactured in accordance with the necessary specifications, or if a lifting component or the concrete around the recess has been damaged or worn, mismatching of clutches with anchor pins can occur.¹⁵ While a 2.5 tonne clutch will engage the head of a 1.3 tonne anchor pin if the recess around it allows, it can slip off the anchor pin head if the clutch rotates sideways.¹⁶

¹³ See photographs in Exhibit 1, Tab 9

¹⁴ ts 8 per Mackay Sim, R ; Exhibit 1, Tab 22 diagram; Exhibit 1, Tab 28

¹⁵ ts 8 per Mackay Sim, R

¹⁶ Exhibit 1, Tab 22

24. The likelihood of concrete components not being manufactured in accordance with the original specifications is thought to be low. However, according to Mr Mackay Sim, there are many copies of the lifting components made to similar nominal dimensions as the original design specifications in order to enable them to fit together. These components are of varying materials and quality and are sold by companies of widely varying technical knowledge or ability in the technology.¹⁷
25. Mr Ebert tested a soakwell lid manufactured by the company that supplied the soakwell lid which fell on the deceased and found that, when two examples of a known brand of 2.5 tonne clutch were applied to a 1.3 tonne anchor pin, one of the clutches could fit in the anchor pin recess and the other could not.¹⁸
26. A representative of that company later emailed Mr Ebert advice that testing on recesses of 1.3 tonne anchor pins on the company's precast concrete manufacturing site showed that even a new 2.5 tonne clutch would fit in most of the recesses without a great deal of trouble. The email noted that 2.5 tonne clutch slots are specified to be 18 mm wide and the head of 1.3 tonne anchor pins are 19 mm wide.¹⁹ It appears to me that the small 1 mm overlap accords with Mr Mackay Sim's evidence that 2.5 tonne clutches can slip off 1.3 tonne anchor pin heads if the clutches rotate.

THE CAUSE OF THE LIFT FAILURE

27. Worksafe inspector Colin Buck attended the construction site within a short time after the soakwell lid lift failure. He seized four lifting clutches attached

¹⁷ Exhibit 1, Tab 22

¹⁸ Exhibit 1, Tab 21

¹⁹ Exhibit 1, Tab 29

to the crane that had been used in the lift. They were all found to be 2.5 tonne clutches.²⁰

28. Mr Buck noted that the heads of the two anchor pins embedded in the soakwell were damaged, consistent with the clutches having peeled free of the heads of the anchor pin.²¹ The anchor pins were the 1.3 tonne size, with the size marked on the head.²²
29. When Mr Ebert attended the construction site two days later, he went with the site manager to the riggers' equipment locker, where a pair of 1.3 tonne clutches was found in an apparently unused condition.
30. When asked for his opinion of what went wrong to cause the lift failure, Mr Mackay Sim, whose evidence I accept, said that the deceased was the final and fatal link in a chain of errors.
31. The first error identified by Mr Mackay Sim was the design of the soakwell lid, a large flat panel with only two lifting points, which made an inherently unstable design. He explained that, when the crane slewed the lid, sideways force initiated a transfer of the load sideways and caused the lid to tip about the axis between the lifting points. He said that normal practice is to lift any flat object by three, or preferably, four points for stability.²³
32. The second error was the deceased's error of judgement in using the 2.5 tonne lifting clutches on 1.3 tonne anchor pins. In Mr Mackay Sim's view, it was inconceivable that a man of the deceased's knowledge and experience would not be aware that clutches and anchor pin systems would go together.²⁴
33. In an interview with WorkSafe inspectors, the deceased's supervisor said that, in his experience,

²⁰ Exhibit 1, Tabs 20 and 21

²¹ Exhibit 1, Tab 9 photographs 11, 12 and 19

²² Exhibit 1, Tabs 20 and 21

²³ ts 15 – 16 per Mackay Sim

²⁴ ts 15 per Mackay Sim, R

clutches fit one type of lifter (he used the term 'lifter' as the component to which a clutch attached) and that an experienced rigger could tell by looking at a lifter what size it was. He said that he had never experienced a situation where clutches could fit onto the wrong sized anchor pin, and he did not think it was possible. He said that the crane was fitted with 2.5 tonne clutches because they were used for tilt-up panels.²⁵

34. Mr Mackay Sim said that, if the deceased had used the correct sized clutches, it is probable that the soakwell lid would not have disconnected. He said that the unfortunate situation was that there were two things that went wrong: the load was inherently unstable and the wrong sized clutch allowed the anchor head to slide through the slot in the clutch when the soakwell lid tipped.
35. In addition, Mr Mackay Sim said that the person in charge of the lift, the deceased in this case, should have stayed outside the drop zone of the lift.²⁶ He said that he found it difficult to believe that the deceased was five metres away from the soakwell lid when it fell on him²⁷ (as the crane driver suggested in his statement).²⁸ He said that he could only speculate that perhaps the inertia of the slewing of the crane took the soakwell towards the deceased, but the important thing was that no-one should be in the drop zone.
36. Mr Mackay Sim noted that the deceased may have been using the five metre tagline to stabilise the soakwell lid.²⁹ He said that a load should be stable enough in all lifting operations to make sure that it can be lifted without anyone near it.³⁰

²⁵ Exhibit 1, Tab 11

²⁶ ts 16 per Mackay Sim, R

²⁷ ts 22 per Mackay Sim

²⁸ Exhibit 1, Tab 14

²⁹ ts 22 per Mackay Sim, R

³⁰ ts 23 per Mackay Sim, R

37. In my view, another possible error in the series leading to the death was an apparent failure of the manufacturer of the soakwell lid to ensure that the recess around the anchor pins did not allow 2.5 tonne clutches to be used.
38. In the circumstances described above, I am satisfied that the deceased attached 2.5 tonne lifting clutches to 1.3 tonne anchor pins on an inherently unstable 800 kg concrete soakwell lid and then did not ensure that he was out of the drop zone when the soakwell lid was lifted by a crane. Once lifted, the soakwell lid rotated and the clutches slipped off the anchor pins, allowing the soakwell lid to fall onto the deceased.

HOW DEATH OCCURRED AND CAUSE OF DEATH

39. Given the circumstances described above, I find that death occurred by accident.
40. As to the manner of death, on 15 July 2011 Chief Forensic Pathologist, Dr C T Cooke conducted a post mortem examination of the body of the deceased and found severe 'crushing-type' injuries to the chest and abdomen with extensive fractures to the heart and lungs. Both thigh bones were fractured and there was fracture-dislocation of the neck.³¹
41. Dr Cooke formed the opinion, which I adopt for my finding, that the cause of death was multiple injuries.

REGULATION OF PRECAST CONCRETE ELEMENTS IN BUILDING CONSTRUCTION

42. Australian Standard AS 3850 'Prefabricated concrete elements' consists of two parts. 'Part 1: General requirements' (**AS 3850.1**) provides general requirements for the materials, components and

³¹ Exhibit 1, Tab 4

equipment used in the manufacture of prefabricated concrete elements.³² 'Part 2: Building construction' (**AS 3850.2**) provides requirements for planning, construction, design, casting, transportation, erection and incorporation into the final construction of prefabricated elements in building construction.

43. The express scope of AS 3850.2 is to apply to prefabricated concrete elements including, but not limited to, wall elements, columns, beams, flooring and façade elements used in building construction. It expressly does not cover concrete pipes or culverts used in civil construction works to channel water under roads, railways or embankments, and does not cover small elements, like bricks, blocks and pavers, that can be handled manually. These elements which are not covered in AS 3850.2 are covered by other Australian Standards.³³
44. The scope of AS 3850 is understood to apply only to building construction and not to civil construction.³⁴ It did not apply to the soakwell lid at the time of the deceased's death.
45. Mr Mackay Sim, who was the drafting leader of a committee responsible for the development and maintenance of AS 3850, provided a report in which he explained that the scope of AS 3850 in its iterations in 1990 (AS 3850:1990) and 2003 (**AS 3850:2003**) was limited to flat tilt-up panels rotated about an edge during manufacture or erection whether cast on-site or off-site.
46. AS 3850:2003 was revised in September 2015 to extend its scope to all prefabricated concrete elements used in buildings. The committee was specifically requested not to include precast elements for civil

³² Exhibit 1, Tab 30

³³ Exhibit 1, Tab 31

³⁴ Exhibit 1, Tabs 22 and 33

applications.³⁵ AS 3850:2015 still does not apply to soakwell lids.

47. While AS 3850:2015 provides 'requirements' related to manufacturing and using concrete elements in building construction, it does not provide a means of enforcing those requirements.
48. Safe Work Australia, an independent Australian government statutory body which is charged with developing national policy on work health and safety and workers' compensation, is, as I understand it, responsible for the National Code of Practice, which was developed by the former Australian Safety and Compensation Council at a time when precast, tilt-up and concrete elements were an emerging technology in the building construction industry.
49. The National Code of Practice does not cover any form of construction work other than building construction. It does not cover soakwell lids.³⁶
50. In addition, a representative of Safe Work Australia advised by letter dated 2 December 2016 that the National Code of Practice is not a code of practice for the purposes of the model Work Health and Safety laws, and that it is listed on the Safe Work Australia website as 'under revision'³⁷. My own attempt to find the National Code of Practice on the Safe Work Australia website was futile. There did not seem to be any reference to it.
51. In any event, even if the National Code of Practice did include civil construction, Safe Work Australia could not enforce it in Western Australia since Safe Work Australia does not have responsibility to regulate work health and safety laws. One of Safe Work Australia's

³⁵ Exhibit 1, Tab 22

³⁶ Exhibit 1, Tab 33

³⁷ Exhibit 1, Tab 33

functions is to prepare model codes of practice for adoption by the States and Territories.³⁸

52. Regulation of work health and safety in Western Australia is the responsibility of WorkSafe WA, a commission created under the *Occupational Safety and Health Act 1984* (**the OSH Act**), and the division of the Department of Commerce which assists the Minister in the administration of that Act under the name WorkSafe (**WorkSafe**).
53. Under section 57 of the OSH Act, the Minister may adopt any code of practice. The effect of an adoption by the Minister is to provide practical guidance to persons that are subject to a duty under Part III of the OSH Act. Part III is headed 'General provisions relating to occupational safety and health' and provides several duties and creates offences for failure to comply with them.
54. The Minister has not adopted the National Code of Practice.
55. Some regulations in the *Occupational Safety and Health Regulations 1984* (**the OSH Regulations**) require compliance with certain parts of codes of practice. In some cases, a failure to comply is an offence.³⁹
56. The National Code of Practice is not cited in the OSH Regulations.
57. Likewise, the OSH Regulations can require compliance with an Australian Standard. Compliance with AS 3850:2003 is required in Part 3, Division 9 of the OSH Regulations, which relates only to tilt-up panel work.

³⁸ *Safe Work Australia Act 2008* (Cth) s6

³⁹ For example, Regulations 5.45 and 5.47 in relation to the Code of Practice for the Safe Removal of Asbestos.

58. The upshot of the foregoing is that there is currently no application of the National Code of Practice or AS 3850:15 in Western Australia in relation to civil construction works. The only regulation of the use of precast concrete components appears to be provided by Part III of the OSH Act.

THE NEED FOR REGULATION

59. In oral evidence, Mr Mackay Sim explained the reasons for excluding civil construction from the scope of AS 3850:2015.⁴⁰ As those reasons appear to me to be of historical interest only and are no longer pertinent, it is sufficient to say that the crucial question arising from his evidence is whether AS 3850:2015 should apply to civil construction as well as building construction.
60. In his report, Mr Mackay Sim stated that his long-held opinion has been that the requirements for lifting precast concrete elements should apply to all elements, regardless of application.⁴¹ In oral evidence, he expanded that opinion to say that he recommended that AS 3850:2015 be extended to apply to civil works, and not be limited to the requirements for lifting.⁴²
61. Mr Mackay Sim explained that AS 3850:2015 provides that the engineer who designs a concrete component is responsible to design the rigging for the lifting operation and to provide documentation at the construction site of that rigging. In that way, the design engineer provides guidance to the eventual rigger.⁴³
62. AS 3850:2015 requires that 'The layout of the lifting points and the rigging configurations be designed to ensure stability of the element without manual assistance, that may place an operative in the drop

⁴⁰ ts 31 – 32 per Mackay Sim, R

⁴¹ Exhibit 1, Tab 22

⁴² ts 27 per Mackay Sim, R

⁴³ ts 23 - 24 per Mackay Sim, R; Exhibit 1, Tab 31, p.50

zone, during all lifting and handling operations.’ Commentary in relation to that requirement includes the statement: ‘Three or four lifting inserts ... should be provided for lifting thin wide elements (e.g. large pit lids) which can become unstable if lifted from only two inserts placed in the face or side of the element’.⁴⁴

63. It is apparent that, if the requirements of AS 3850:2015 had been in place and had been followed in 2011, it is unlikely that the accident which caused the deceased’s death would have occurred.
64. Further tragedy occurred when two construction workers were killed on 5 October 2016 at Eagle Farm Racecourse in the north of Brisbane when a large concrete panel fell on them while they were in a pit. Mr Mackay Sim told the inquest that the accident would not have occurred if the work had been done in accordance with the principles of AS 3850:2015.
65. In 2016 Mr Bishop sought a submission on the question of whether AS 3850:2015 should apply to civil construction from the National Precast Concrete Association of Australia (**National Precast**), the peak body for the Australian precast concrete industry.
66. In a letter dated 2 May 2016 the CEO of National Precast, Sarah Bachman, stated that National Precast supports an extension of the scope of AS 3850:15 to civil construction, and suggested that such an extension could most easily be done by amending Parts 1 and 2 of AS 3850:2015 as necessary and by creating an additional *Part 3: Civil Construction*.⁴⁵
67. Ms Bachman also stated that, since the publication of AS 3850:2015 in September 2015, National Precast has been calling on Safe Work Australia to urgently prioritise the revision of the National Code of Practice to reflect AS 3850:15 in order to eliminate confusion in the market.⁴⁶

⁴⁴ Exhibit 1, Tab 31, p.11

⁴⁵ Exhibit 1, Tab 25

⁴⁶ Exhibit 1, Tab 25

68. On 30 January 2017 Ms Bachman sent Mr Bishop a copy of a project proposal which National Precast intended to present to Standards Australia in order to start the process of the suggested amendment of AS 3850:2015. On 31 January 2017 I sent a letter to Ms Bachman to indicate my support for National Precast's proposal to Standards Australia. I have recently been informed that National Precast submitted the proposal on 6 February 2017.
69. On 15 March 2017 National Precast's technical services manager sent Mr Bishop an email attaching the completed project proposal form, which shows that the proposal is supported by the Civil Contractors Federation of WA, the Crane Industry Council of Australia and the Concrete Pipe Association of Australia.
70. By letter dated 2 December 2016, Amanda Johnston, Branch Manager WHS Technical & Legal Police at Safe Work Australia, answered a query from Mr Bishop as to whether Safe Work Australia supported a recommendation that the National Code of Practice be extended to civil works. Ms Johnston stated that, at that time Safe Work Australia did not have a position on the matter. She explained that Safe Work Australia intended to consider the matter in 2017 after Workplace Health and Safety Queensland had completed its review of the *Tilt-up and pre-cast construction Code of Practice 2003*.
71. In my view, the foregoing evidence makes clear that there are good reasons to apply the requirements of AS 3850:2015 to civil construction works as soon as possible, and no reasons whatsoever not to do so. It is, in current popular usage, a no-brainer.
72. I therefore encourage Standards Australia and Safe Work Australia respectively to amend 3850:2015 and the National Code of Practice accordingly as soon as possible.

73. It also appears to me that, if legally efficacious, there should be urgent amendment to the OSH Regulations to apply AS 3850:2015 to civil construction works, notwithstanding the fact that the scope of AS 3850:2015 expressly excludes that application.
74. I make the following recommendation to reflect that view.

Recommendation

That the Western Australian Commission for Occupational Safety and Health and the Minister of Commerce consider and, if appropriate, implement as soon as possible amendments to the *Occupational Safety and Health Regulations 1984* to apply the requirements of AS 3850:2015 to civil construction works.

CONCLUSION

75. The deceased died in a tragic workplace accident in 2011.
76. His family have patiently awaited the holding of an inquest with hopes that it would lead to changes that might reduce the likelihood of other families suffering similar traumatic loss.
77. It is important that such changes occur without further delay.

B P King
Coroner

18 April 2017