# LOCAL COURT
# New South Wales
## Wollongong

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| **Jurisdiction:** | Coronial |
| **Matter:** | Inquest into the death of Setaleki Kolomaka |
| **Hearing dates:** | 22, 23 , 26 April 2012<br><br>6,7 June 2012 |
| **Date of Decision:** | 20 June 2012 |
| **Magistrate:** | Ian Guy<br><br>Deputy State Coroner, Wollongong |
| **Representation:** | Mr P Skinner, Barrister, Counsel Assisting i/b Ms J Kavanagh, Crown Solicitor's Office .<br><br>Mr S. Longhurst , Barrister ,for the family<br>Mr R Reitano ,Barrister for WorkCover<br>Mr H.Dixon SC with Mr I. Taylor- for Allied Industrial Services Pty Ltd, Veolia Environmental Services Pty Ltd and Mr Lee<br>Mr J Agius SC with Mr D Chin for Mr Lee(for 6 .7 June 2012)<br>Mr S.Meehan ,Barrister for Blue Scope Steel AIS P/L<br><br>Ms F. Bustos-McNeil ,Solicitor for Standards Australia<br><br>Mr G Sivaraman ,Solicitor for Mr Corea, Mr Poposki |

## Reasons for findings

1. In May 2008, Mr Setaleki Kolomaka had been employed with Allied Industrial Services Pty Ltd (Allied) for approximately 7 years. Allied had a contract with Blue Scope (AIS) Steel (Blue Scope) to provide relevantly, industrial cleaning services at the Port Kembla facilities. Mr Kolomaka's duties included the use of high pressure water jetting for cleaning. High pressure water jetting has the potential to provide immensely powerful flows of water from devices that in some cases were held by hand.

2. On 22 May 2008,Mr Kolomaka and two other employees were cleaning a sediment pit. Mr Kolomaka was holding a lance directing the water into the pit. Mr Corea was operating the machinery that generated the pressure to force the water through the lines and lance. Mr Poposki was operating a foot pedal that when released would stop the water flow. Contrary to an Australian Standard concerning high pressure water jetting and Allied's own operating procedures, Mr Kolomaka had no direct control over the water flow by way of a trigger device. There were no handles on the lance.

3. Mr Kolomaka lost control of the lance. Before the water flow could be stopped, a water jet flow hit him at very close range causing fatal injuries.

4. A post mortem concluded the direct cause of death as traumatic injuries to the left chest wall, left lung and heart due to the high pressure water jet blaster.

5. The requirements under the Coroners Act 2009 to determine the identity, date and place and cause of death are clearly satisfied. The manner of death and any recommendations that might be made to improve worker safety have been the primary concern. This inquest is not intended as a broad ranging enquiry as to compliance or otherwise by Allied of its responsibilities under the Work Safety legislation. Any examination of and comment upon the manner by which Allied ensured the safety of its workers is in the context of findings as to the manner of Mr Kolomaka's death and consequent recommendations.

6. These findings do not purport to be an exhaustive summary of all the voluminous folders of evidence tendered or of the oral evidence taken, although I have taken into account all the evidence and the submissions of the parties.

7. With the family's consent, I will refer to Mr Kolomaka by his christian name, Seta.

8. The evidence shows Seta was a valued employee at Allied. He was universally regarded as hardworking and conscientious; a man who would willingly take on the tougher aspects of the job. His large physique and strength no doubt assisted him in the often-assumed role of holding the water lance or gun. It was his size, strength and ability to hold the equipment that may have indirectly cost him his life.

**ISSUES**

9. The issues can realistically be reduced to the following –

    What happened on 22 May 2008?

    What factors combined to cause the accident?

    What recommendations can be made to improve worker safety?

**Background facts**

10. To better understand how the death occurred it is appropriate to briefly outline aspects of high pressure water jetting and the company.

11. Allied had been established for some 70 years, providing services to Blue Scope such as high-pressure water jetting, plant hire and general cleaning around Blue Scope's Port Kembla plant. Allied operated a site office, equipment yard and maintenance facilities at the recycling area of the Port Kembla plant and owned the relevant high pressure water jetting equipment.

12. Allied was purchased by Veolia Environmental Services (Australia) P/L (Veolia) in April 2008. Allied staff were employed by Veolia from April 2009.There were levels of management within Allied. Seta, Mr Corea and Mr Poposki were labourers who were supervised by front line managers. Above them were supervisors with Mr Will Lee occupying the position of the most senior officer in Occupational Health and Safety.

13. There were at the time industry guidelines for the safe operation and maintenance of high-pressure water jetting systems contained in an Australian /New Zealand Standard (the Australian Standard), published by Standards Australia.[1] Allied picked up several parts of the guidelines, setting them out in a document entitled "Safe operation of high pressure water jetting units"(Allied safe operating procedure).[2] This document was in part created by Mr Lee and distributed by supervisors to the labourers as part of a work instruction package.

14. There were also levels of management from Blue Scope who were involved in the provision of authorisation to Allied staff to carry out the work. Blue Scope employees largely relied upon the expertise of Allied staff for completion of the cleaning tasks.

[1] Vol 1 p126
[2] vol1 p 266

15. There are a number of high-pressure water jetting systems. The equipment used by a Seta, Mr Corea and Mr Poposki consisted of a high-pressure water jetting pumping unit connected via a high-pressure hose to a foot pedal which in turn was connected to the lance that was used to break up and dislodge the scale build up in the sediment pit.

16. Mr Stanbury, an expert in high pressure water jetting explained the principles of water jetting in this case. He said the pump unit is a positive displacement plunger pump meaning that other than water that is released from a safety or relief valve, all of the volume of water passing through the pump is passed down the high-pressure hose. Pressure is then generated at the end of the hose by restricting its passage with a nozzle or jet of a smaller diameter. He said that simplistically, the smaller the nozzle the higher the pressure that can be generated up to the ceiling pressure of the pump that is preset and governed by safety devices such as a safety relief valve.

17. Mr Stanbury went on in his report to explain the forces that are generated in using a lance or gun. He said—

> "The water jet generated by the system in turn generates an equal and opposite reaction. This reaction force is not simply proportional to the pressure generated by the system but is a product of both the pressure and the volume. If a larger nozzle water jet is fitted to the system at a constant pressure, more reaction force will be produced".[3]

18. The reaction force is in turn felt by the operator who holds the lance or gun. It is clear an excessive reaction force may impact on the ability of the operator to control the lance or gun. As discussed below, there are recommended reaction force limits when using a hand held device.

19. Using a hand held device brings clear potential dangers. Allied's own training manual compares the velocity of high-pressure water to a bullet. A 2.9 gram bullet travels at 299m a second. An equivalent weight of water at a water pressure of 1500 Bar (the metric unit of pressure) travels at 408 m per second.

20. Mr Stanbury said high-pressure jetting using a hand lance or gun is one of the most hazardous activities that can be undertaken in the industry. There was he said a significant risk of an operator "shooting" themselves by inadvertently turning the lance or gun so that the high pressure water jet is directed at their body. Of the two examples given by Mr Stanbury where this can occur one is directly relevant to this inquest, namely a gun or lance is not fitted with a trigger at all and the operators looses control and "shoots" themselves.

[3] Brief p 104

21. Mr Poposki said once you let the lance go it is virtually impossible to get control of it again until the pressure is turned down. He summed the dangers this way—

> "The 10,000 PSI that we were using for this job is extremely dangerous. If you were to get in front of the water jet it would split you in half. The water is powerful enough to break up concrete if used for a prolonged period. To give you some idea of the strength of the water, the excavator we were using could not dislodge the sediment in the tank but the lance had no problem at all cutting it away".[4]

**Events on 22 May 2008**

22. It was in April 2008 that Blue Scope determined the sediment in the settlement tank was to be removed. On 13 May 2008 representatives from Allied and Blue Scope attended the site to discuss how the work was to be carried out. Mr Niloloski, leading hand and Mr Wray, supervisor from Allied decided that water jetting using a steel lance and vacuum equipment would be used to break up the material. It was hard sludge and the worst Mr Nikoloski had seen.[5]

23. Blue Scope issued Allied with a requisition order and an Authority to Work permit that was required before work could commence.

24. A three-man crew comprising Seta, Mr Corea and Mr Poposki were sent to the site and started work on Tuesday 20 May. Seta was using a gun with a trigger and a lance that has no trigger. The lance was used to break up some of the sediment as it was becoming more solid the deeper they got into the pit.[6]

25. On 21 May, Seta and his colleague continued with the work. On 22 May, the same three workers returned to the sediment pit. Mr Corea was operating the machinery that sets the water pressure. Mr Poposki was using the pedal that when released cuts off the water flow. Seta was using the lance. He was wearing a disposable pair of overalls called a "sperm suit" and a pair of gardening gloves. They had been working when a group of persons from Blue Scope and Allied attended the site about 8.30 am. The Allied staff were --

> . Mr Mc Carthy, supervisor
> . Mr Petrevski, safety officer
> . Mr Lee, Chief safety officer

26. The meeting considered the viability of Allied staff entering the confined space of the sediment pit to continue the cleaning, however authority from Blue Scope was not available. According to Mr Corea, he was called over to the barricade by Mr Lee who said--

> "We were talking and maybe you should put a bigger tip on the lance." I said-"Yeh, maybe it might push it more'

[4] Page 52 para 21
[5] Brief p610 q62
[6] Corea statement para 12

Mr Lee-“Yeh, you’ll get more water flow out of it. You should use a 2mm or 2.2 mm. I have the tips in my office”.
I said-“When we go for a smoko I will come and see you”
Mr Lee-“Yeah all right”

27. Mr Corea says less than a minute later Mr Lee came back and said-
“Take Sean’s ute and go back to the yard and get the tips”. Mr Corea went to the yard and found a lance with a 2 mm tip in it and returned to the work site, telling Mr Lee-
“I couldn’t find the 2.2mm but I got one with 2mm”

28. Mr Corea says Mr Petrevski unscrewed the tip, looked at the nozzle and put it back on without comment. Mr Lee said to Mr Corea-
“It will be harder to hold but as long as Seta is holding it, it should be alright.”

29. Seta told Mr Corea that they would try the new lance and tip .By the time they had changed over the lances, Mr Lee and the other management staff had gone. Seta used the lance for about 15-20 minutes, there was a “smoko” break and work continued with Seta saying it is cutting up the chunks bigger and it is harder to get down the hose. Within about 15 minutes of resumption of work, the accident happened. Mr Corea was operating the pressure equipment, Mr Poposki was operating the foot pedal. Both were standing about 2 to 3 metres behind Seta who was using the lance with the end braced against his left shoulder.

30. Mr Corea saw the lance shoot backwards under Seta’s left arm and Mr Corea yelled “stop, stop” to Mr Poposki.[7]He saw Seta trying to catch the lance as it was shooting under his arm after he lost control of it .The end of the lance swung around in a arc and he turned away fearing the lance was going in his direction. Mr Poposki did not see the lance come out of Seta’s hands but saw the watery spray. Seta dropped the lance and put his hands to his side and chest and sat down. Within minutes he was losing consciousness and died at the scene.

31. Neither Mr McCarthy nor Mr Petrevski has any relevant recollection about a conversation with Mr Lee or the subsequent discussion with Mr Corea about the change of nozzle tip. Mr Lee told WorkCover that the crew had been flushing the liquid in the pit and suggested a longer lance and more efficient Woma tip rather than a screw in type. He was asked the following—
Q51: What would be the difference in changing the tip and length of the lance with respect to undertaking the cleaning out of the sediment tanks?
A: Probably no difference whatsoever.
Q: Then why were the changes to the equipment required?
A: Mainly the length of the lance for the application inside of the pit.[8]

[7] police statement para20
[8] Brief p 761

32. Mr Lee said in evidence he “can’t recall” saying to Mr Corea that it (the lance) would be harder to hold. He said, “I don’t think it is right”. It was not an emphatic denial. There is evidence that the question of the impact of the reaction force on Seta was in Mr Lee’s mind. He told WorkCover that Mr Corea should go no larger than a 2mm tip because of the reaction force, saying to WorkCover “Once you start going into the higher diameter the reaction force is going to be higher”.[9]

33. It was said in submissions on behalf of Mr Lee that he did not believe there would be a greater reaction force from the change of tip. He made the assumption that they were operating at low pressure, as he believed they were flushing the liquid and this he said is done at low pressure. The foundation for this assumption (it transpired the crew were working at or close to maximum pressure) should be considered.

34. Mr Lee said he was observing the operation for about 2 minutes. He looked at Seta and did not see a lot of reaction force. He saw Seta standing up and not leaning that suggested to him a low operating pressure. What Mr Lee did not do was--
    . Look into the sediment pit
    . Speak to Seta or Mr Poposki
    . Know the role of Mr Corea with whom he did speak
    . Ask why Seta was not in direct control of the water supply
    . Know or ask what operating pressure they were using
    . Ask if there was a written risk assessment
    . Discuss any risks with the change of system he proposed
    . Discuss any controls of the risks.

35. It would be fair to say the foundation for Mr Lee’s assumption was scant. He acknowledged that in hindsight he should have discussed several of the above matters. It was submitted on behalf of Mr Lee that he was relying upon the supervisors to address many of these factors. Just how reliable this view was will be discussed shortly.

36. It was further submitted on behalf of Mr Lee that he was at the site to discuss the question of an entry into a confined space in the sediment pit and that he was not there as an “OH and S policeman”. It is unclear why a person who has a responsibility to ensure the safety of workers would be categorised as a policeman and unclear why a chief safety officer with extensive experience in the water jetting industry would not continue to bring apply those responsibilities regardless of the task performed.

**ISSUE2 –What factors combined to cause the accident**?

37. Mr Stanbury’s report has in my view correctly identified a number of factors that operated this day that contributed to the accident. They are in summary—

[9] Brief p 762

. The absence of handles or adequate means of control allowing the lance to slide between the hands.

. The absence of a shutoff device or trigger on the lance to stop the water when control of the lance was lost.

. Excessive reaction force on the lance from too large a water jet.

. The absence of protective body Personal Protective Equipment.

. The absence of a comprehensive risk assessment.

**The absence of handles**

38. Seta was using a high-pressure water-jetting lance with no handles or other means of control. It is to be remembered that there may be very considerable reaction forces or back thrust on the operator holding a lance. The lance will in many cases be wet from the water jet and back flows. The lance is narrow with a diameter of approximately 25 mm and is about 3 metres in length. Seta was using household cotton gardening gloves and leaning over a railing with the lance pointed into the sediment pit. Mr Corea agreed Seta was standing on an area with loose debris and full of trip hazards, saying they had to clean the area of material from the blow back a couple of times.[10]

39. The potential for a lance to slip between the hands would be self-evident. Handles on the lance would be a logical method of providing some means of control. Remarkably, they were rarely if ever used for the task Seta was performing. Mr Corea said he had been a water jetter for 5 years and used a lance with handles once or twice and had not seen a handle for a lance for a long time.[11] Mr Poposki, an experienced water jetter, never saw handles on lances, did not know they existed and was unaware there were stands for lances.[12]

**40.** Even more disconcerting is that some levels of management involved in supervision and safety were similarly no wiser. Mr Nokoloski, leading hand, trained in water jetting and supervisor of Seta said of the lances “we never had handles” and stands had not been used before the accident.[13] Mr McCarthy, supervisor, was unaware the lances could have handles[14] and said that stands were only used for work in confined spaces.

41. Mr Stanbury makes the important point that even if the lance had a handle fitted, it would still not meet the Australian Standard. This leads to the next factor operating on this day.

**The absence of a shut off device or trigger on the lance**.

[10] T 23/4/12 p47
[11] question 90 WorkCover statement
[12] t 23/4/12 p 76
[13] ibid p 98
[14] ibid p 229

42. There are 2 relevant parts of the Australian Standard which can also be found in Allied's safe operating procedure.

43. Clause 5.3 of the Standard relevantly provides that systems should be failsafe and have 2 control mechanisms. The Allied document (clause 1.17) provides all operations will have at least two means of stopping the flow of high pressure water. Contrary to both documents, the lance had no trigger to shut off the water.

44. The other relevant Australian Standard clause is 6.7(a) that provides persons operating the lance or gun should have direct control of the water flow. The Allied document (clause 3.9) is in similar terms.[15] Contrary to both documents, Seta had no direct control. It was Mr Poposki operating the foot pedal.

45. The danger of someone other than the operator in direct control of the water supply is addressed by Mr Stanbury. He noted the foot valve was in this case considered the primary shutoff device from an operational perspective and also in the event of an emergency. This relies on the operator controlling the foot valve being vigilant, having good reflexes and paying attention to the operator controlling the lance at all times. It rested on the operator controlling the foot pedal to shut the water down immediately to prevent any injury to the operator controlling the lance in the event of an emergency.Mr Stanbury said due to the reaction forces involved, the speed things happen is so fast that when designing safety systems on ways to mitigate risks, you should not rely on peoples' reactions because they just aren't quick enough.[16]

46. Mr Stanbury made the important observation that the only time a lance is really acceptable is if it is mechanically secured somehow and the operator is remote from it. It was "absolutely" the industry standard prior to May 2008.[17]It is clearly troubling that Allied was not operating in accordance with the industry standard.

47. The dangers of relying on another to control the water were amplified by a system that relied in some cases on hand signals when the operator should be holding the lance or when calling out against the background noise of the machinery. It is true as senior counsel for Allied noted in submissions, that the water jetting training package requires signals between the workers. To do so though when another person is operating the water supply would only increase the risk to the workers.

48. It is clear from the evidence the reaction to release the foot pedal came after the loss of control of the lance by Seta. There was only one method of shutting off the water by a person other than Seta operating the foot pedal. The question why there was such a marked failure to comply with the Australian Standard and Allied's own written operating procedure is

[15] vol 1 p128
[16] t 24/4/12 p 168
[17] ibid p 175

answered simply. It was the way it was always done. The following summary suffices—

. Mr Corea was aware of the reference to direct control and that it was not being complied with. He explained the difficulty at times of having the operator using the pedal that can be sensitive, working on uneven ground. It was he said common practice and the supervisors knew they were working this way.[18]

. Mr Poposki that no one ever said anything about the way it was done. It was standard practice during his 6 years of work.[19]

. Mr Nikoloski, leading hand and direct supervisor did the same as the workers –it was always done this way.[20]

. Mr Wray, supervisor saw nothing inappropriate about the way they were working.

. Mr Petrevski, safety officer who in fact carried out high pressure water jet training himself ultimately conceded he knew Mr Corea was going to get a lance and he knew it didn't have a trigger.

. Mr Mc Carthy, supervisor, said it was normal for one person on the lance and one person on the pedal. As a front line manager he was involved in the provision of work packs to the labourers containing safety information including Allied's safe operating procedure. He asserts he was unaware there was a difference between the written and actual procedure.[21]If this is correct, it underscores a lack of training for Allied's own supervisors.

49. A further indication of the lack of appreciation by some within management of anything inappropriate in the manner of work is that a safety audit conducted by Mr Petrevski and Mr Mc Carthy on the preceding day only detected a failure to wear adequate hearing protection. This in turn raises serious questions as to the effectiveness of what Mr Lee said was retraining of supervisors after a safety incident in 2006, when he said audit teams were put together to ensure the work Allied did was in accordance with the Australian Standard.[22]

50. Mr Lee, Chief Safety Officer, said at the inquest "he did not see anything unsafe from his observations". As Seta was to his knowledge holding a lance without a trigger, not having direct control of the water supply and advances that Seta was operating on undulating ground, it is difficult to understand even with the benefit of hindsight how this view was reached.

[18] 23/4/12/ p27
[19] ibid p 63,64
[20] t 23/4/12 p88
[21] t 24/4/12 p 201
[22] Brief p 750 p147

51. He was questioned why he did not tell the workers they were not complying with the safe operating procedures of the operator having direct control of the water supply. Mr Lee said there were 2 hoses, the ground was undulating and the foot pedal is heavy and with that in mind he said the safer method would be someone else being in control of the water supply.

52. A logical response to this suggestion comes from Mr Stanbury's evidence as to the dangers of relying upon the reflexes of another who has control of the water supply. If the ground is undulating you fix the surface you are working on. If the risk cannot be controlled you don't do the job. Mr Stanbury could not envisage a situation where the operator of a lance should have the water supply directly controlled by someone else.

53. Mr Lee ultimately acknowledged in questions from Counsel for WorkCover that the proposition of a person other than the operator controlling the water supply of a lance in these circumstances was "silly". This was a realistic concession.

54. As part of Mr Lee's response as to why he did not stop the workers when they were not following the safe operating procedure, he referred to clause 6.8.1 in the Australian Standard, which provides—

> "The operator inserting the nozzle should have direct control of the water flow to the nozzle except in cases where greater safety can be afforded by other control means".

55. This clause is within a section headed "Lancing and Pipe Cleaning". Lancing is defined in the Standard in essence as involving the insertion /retraction of a lance and nozzle into a pipe or tubular product. In short it has no relevance to the use of a lance in work done by Seta.

56. Mr Lee also referred to the fact the Standard is in terms "should" have direct control of the water supply rather than the more mandatory word "shall". In my view, regardless of what is said in recommendations in a Standard, a company does what is necessary and appropriate, after an appropriate risk assessment for the task undertaken to ensure the safety of its workers. An appropriate risk assessment was not in fact done. This was not a case of Allied turning its mind to the subtleties of language of the Standard and determining a safer method of operation existed than that recommended.

57. The finding it was normal work practice for the operator not to have direct control of the water supply is important when regard is had to the remarks on sentence in the prosecution in 2011 of Allied in the Industrial Relations Court for breaches of then Occupational Health and Safety Act. Her Honour Justice Kavanagh, who was presented with an agreed set of facts, made some observations that on one view might suggest it was the workers including Seta, who had decided to depart from the normal working method, stating—

"Mr Kolomaka was manually operating the water jetting lance, but the crew decided because of the uneven ground that another would be responsible for operating the foot control valve".[23]

58. This inquest is not constrained in its findings by an agreed statement of facts. Unlike sentence proceedings, all relevant witnesses have been called to give evidence. What has clearly emerged in this inquest is Seta and his colleagues were not departing from the normal method of operation. To operate the lance with another operating the foot pedal was in fact the normal method. Allied's "system" in the Safe Operating Procedure that operators should have direct control of the water supply amounted to words on a document that were ignored by those among the highest level of safety management.

**An excessive reaction force on the operator**

59. Mr Stanbury identified there was an excessive reaction force on the lance caused by too large a water jet which Seta failed to hold onto for an extended period of time. He noted that the reaction force was in excess of therecommended 22.5 kg contained in the Australian Standard.

60. Clause 6.7 of the Australian Standard relevantly provides the following—

> (h) The reaction forces should be taken into account when designing a particular job in allocating personnel to ensure forces exerted by the gun and the hose on the jet operator are not excessive.
>
> (i) The reaction force along the axis of the gun barrel should be calculated in order for an average operator to retain control of the gun safely and comfortably. A maximum reaction force of 22.5 kg is recommended for an eight-hour shift and this should not be exceeded for normal operations.
>
> (j) Where a higher reaction force is required to achieve acceptable results consideration should be given to mechanical control of the nozzle.
>
> (k) Where such mechanical assistance is not possible, consideration should be given to the size and strength of the individuals assigned to the task and the time to be spent on the gun. Higher reaction forces than those recommended may be controlled for short periods.

61. Allied's Safe Operating Procedure picked up aspects of the Australian Standard. Relevantly –

> cl (3.13) Reaction forces will be taken into account when planning water jetting tasks. Particular attention will be focused on water jetting units that have high flow rates over 75 L per minute. It is recommended that the reaction force along the gun barrel not exceed 22.5 kg for a continuous eight-hour operation.

[23] Vol I p 374

(3.14) Where the reaction force will be higher than the recommended 8 hour limit consideration will be given to the use of mechanical means to control the attachments or eliminate or lessen the reaction force.

62. The significance of the reference for attention to flow rates over 75 litres per minute in the safe operating procedure is unknown. Mr Lee, an author of the document, could not explain it.

63. Mr Stanbury observed the reaction force recommendation is a very broad one and "most importantly a ceiling or maximum value". The amount of force an operator can hold for a given time will vary significantly and relates to the operator's physical size, experience, ergonomic characteristics of the lance and the environment. Mr Stanbury noted the Standard allows for the ceiling of 22.5 kg to be exceeded for shorter periods, but it has to be based on the outcome of a risk assessment.[24]

64. The question is what was the reaction force operating at the time? The technical formula involves the multiplication of .0224 x litres per minute x the square root of the pressure in the metric Bar. There is some variation in the evidence as to the operating pressure, however Mr Corea said the water pressure was operating at 10000 psi. This was in fact the maximum pressure capacity of the machine. The metric equivalent is 690 Bar. Applying the Woma nozzle chart, a 2mm nozzle and water pressure of 690 Bar gives approximately 63 litres of water per minute. Applying the formula gives an approximate reaction force of 37 kg.

65. Mr Nicholas, a senior manager within Violea presented a series of complex calculations to show the reaction force calculations prepared by the manufacturer of the nozzle that gave a reaction force based on a slightly higher BAR pressure of 42kg failed to take into account the loss of pressure from the hoses and operating system. It is said that there was an approximate 40% loss of pressure and the actual reaction force on Seta was about 27 kg.

66. It is said by Mr Dixon SC for Allied /Violea that it cannot be said that the reaction force was in fact excessive as it is in line with the recommended 22.5 kg limit in the Australian Standard. I do not agree with this submission. There is no evidence to suggest the recommended limit is a net figure after allowance for a series of possible pressure losses. It is in my view artificial to make a meaningful comparison between a gross and net figure for a reaction force. Mr Stanbury said it is usual practice to apply a gross pressure to the chart to select a nozzle unless there is some aspect of the job that would result in a significant pressure drop.

67. As for the actual reaction force operating that day, there is no doubt that pressure losses occurred. Mr Stanbury considers on average about 10% loss through the hoses and there will be further loss throughout the

[24] T 24/4/12 p169

operating system. He says Mr Nicholas' calculations would reflect the worst case scenario and due to variables such as whether the hose had bends, was level and quality of fittings, the only accurate method of determining the pressure was to fit a pressure gauge to the end of the lance when it was still assembled. He made the following important observation—

> "Frictional losses and consequential pressure losses experienced that day are irrelevant as is the true value of the reaction force experienced by Mr Kolomaka. Regardless of what the value of the reaction force was the only fact that can be established without doubt is that the reaction force, whatever it was, was too much for Mr Kolomaka to hold under the prevailing circumstances. The consequence of this was that he lost control of the lance and the water caused fatal injuries to him as he did not have control of the water flow".[25]

68. Mr Nicholas asserts there was little variation in the reaction forces generated with the new nozzle introduced at the time of the accident compared to the nozzle that was initially used. He says the original nozzle was a 2mm drilled nozzle that is less efficient than the substituted Form 4 2mm nozzle that provides a different water flow. There was he says an increase in reaction force prior to factoring the losses through the hoses of 4.2 kg. The calculations come solely from Mr Nicholas as he examined the original nozzle rather than the WorkCover inspector. It was on any view an important piece of evidence and its integrity and provenance should have been achieved by WorkCover taking possession of the original nozzle.

69. The recommended ceiling reaction force at which consideration should be given to mechanical means of control was a gross figure of 22.5 kg. This appears both in the Australian Standard and Allied's own procedures. The gross reaction force for the equipment Seta was operating was about 37 kg. To understand how Seta could have been operating markedly above the recommended limit requires consideration of the workers' understanding of reaction forces and their ability to ensure they were operating within safe limits.

70. There has been much said in the inquest about nozzle charts and their availability. The charts do not give a reaction force. They contain on the horizontal axis nozzle diameters and pressure levels on the vertical axis. By referring to both, a corresponding litre of water per minute is specified. There are marked fields on the chart. Being within field 2 means, after a necessary conversion of the explanatory notes from pounds to kilograms, will be an approximate reaction force operating of 22.5kg.

71. It is clear staff understood the basics of pressure. Mr Corea knew if you turn up the pressure it would give you a greater reaction force. Mr Nikoloski said everyone knew from experience it would be harder to hold with increased pressure. The test he applied however was dangerously simple –"If you push the pressure above this I think maybe you can't hold

[25] Exhibit p 1

maybe they are dangerous". He agreed that his criteria is whether or not you can hold the gun".[26]

72. The only time Mr Poposki and Mr Corea saw a chart was at the water jetting induction course .For Mr Corea that was some 5 years before and for Mr Poposki some 6 years before the accident. Mr Corea only knew that reaction forces existed but didn't know what the numbers were. He only knew there was a kickback and didn't know even if there was a limit. He said- "basically if you could hold it you could use it".[27]

73. Mr Dixon SC for Allied/Violea pointed to the fact that the accepted practice and training was to gradually build up the pressure until the operator is comfortable with the pressure. This true, but Allied had no co-existing system to ensure the operator did not exceed the recommended ceiling reaction force.

74. In the case of some staff that had a supervisory role, their lack of knowledge of the charts and ability to calculate reaction forces was stark.

75. Mr Nokoloski, leading hand who it is to be remembered was Seta's immediate supervisor, was not aware of charts that could be consulted to work out a safe reaction forces even though he had been trained in water jetting by Mr Lee. He was unaware how Seta and others would know if they were dealing with forces higher than 22.5 kg, didn't know how the force was measured or assessed and no worker had ever asked him what kilogram level of reaction force they were dealing within their work.[28]

76. Mr Mc Carthy, supervisor, who had responsibilities for creation of the work packs that contained the Safe Operating Procedure, was not aware a chart was in Mr Lee's office. Most telling was his evidence that he knew there was a chart in the store but was not familiar with its contents. In all the time he had been in high pressure water blasting he never went to a chart and moreover did not know how to use it.[29]

77. Mr Wray, supervisor, suggested the operators should be able to assess the reaction force because of their training.[30] Remarkably, Mr Wray's view that the operators should be able to use the chart came without even asking the workers if they could use it.[31]There was also this disturbing exchange -

    His Honour Q: How did you as a supervisor ensure they were not exceeding the safe operation procedure recommendation?
    A :It was part of the AusJet training, the reaction force.
    Q: How did you expect them to do it?

[26] T 23/4/12 p 101
[27] Brief p46
[28] T 23/4/12 p 89
[29] t 24/4/12 p 210
[30] t p 128
[31] T p131

A :I'm not sure.[32]

78. Consideration should then be given to the evidence of Mr Lee. He said the operators were not trained in nozzle selection .He said there was little knowledge about nozzle selection at that time. This is some difficulty with this statement. There is no evidence to suggest some breakthrough in industry understanding occurred after the accident.

79. Mr Lee said he did not teach the operators as part of the course how to use the chart. He said the operators did not know how to determine if they were over the 22.5kg reaction force, "but the supervisors know how to determine it" and that he "would expect the supervisor to police it".

80. There then arises the following unsatisfactory and contradictory state of affairs. Mr Lee said it was for the first line mangers being the supervisors to normally use the chart to work out the reaction force and nozzle size, yet Mr Mc Carthy had never gone to the chart, didn't know how to use it nor aware it was to be used as a risk assessment tool. Mr Lee said the labourers weren't trained on nozzle selection and reaction forces yet Mr Wray said they should be able to work out reaction force from their training. In light of the evidence from the supervisors, Mr Lee's apparent reliance upon the supervisors would appear to have been flawed.

81. It would however be entirely wrong to lay blame with the supervisors. What it does reveal is a fundamental lack of training by Allied of its more senior staff.

82. It is against these observations that further mention should be made of the decision in the Industrial Relations Court. Again my observations are not in any way intended as a criticism of Her Honours ultimate findings on the evidence presented. The agreed statement of facts says –

> "If the operators had applied the size of the nozzle and the pump operating speed at the time of the incident to the URACA nozzle chart, they would have seen a reaction force located in field 3 of the chart. Field 3 provides that for reaction forces over 250 N, the nozzle must be mounted on a mechanical system".[33]

83. An available inference from this statement is Seta and his co workers failed to follow procedure in not referencing the chart. The evidence in fact shows a lack of understanding of reaction forces beyond the basics. Some supervisors were not adequately trained -if at all- about the need to refer to the chart. There was no normal work practice of referral to a chart. There was no company procedure operating to ensure workers referred to a chart or otherwise complied with the recommended reaction force limit of 22.5 kg. Far from Seta failing to follow a procedure, there was in fact no procedure other than not going past the point where the operator could not hold the lance.

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[32] T p128
[33] Brief p 371

**The absence of appropriate Personal Protective Equipment**

84. Seta was wearing a thin disposable pair of overalls. He was wearing a pair of cotton gardening gloves. The Australian Standard required that PPE appropriate to the risks at hand should be undertaken. An equivalent provision is found in Allied's Safe Operating Procedure.

85. Mr Stanbury says the Kevlar suit might have reduced the severity of the injuries sustained. He does not however recommend that they be mandated in all cases.

**86.** There is evidence staff had raised the question of Kevlar suits with Allied after the incident where Mr Corea received an injury to his chest from water jetting. Mr Lee says Kevlar suits were not used for this level of water jetting across the industry. They are apparently used for ultra high pressure water jetting. Given the dangers that presented Seta when using a lance the question nevertheless arises why a formal risk assessment was not carried out.

**The lack of a comprehensive Risk Assessment.**

87. Mr Stanbury identified a further factor that contributed to the accident. He says a comprehensive Job Hazard/Job Safety assessment identifying the risks associated with the work should have been carried out and if equipment such as a nozzle was to be changed, the risks of this should have been considered.[34]

88. Such an assessment is a fundamental part of ensuring a safe system of work. It essentially involves the breakdown of the job to be undertaken into a series of basic steps, identifying the potential hazards for each step and determining the preventive measures to overcome those hazards.

89. There was a failure by Allied to carry out a general risk assessment for working with a lance and a failure to carry out a risk assessment for the particular task Seta and his colleagues were carrying out.

90. Even with the benefit of hindsight, for an organisation substantially involved in water jetting operations, a risk assessment concerning the use of rigid lances would produce immediate questions such as—is there a danger of losing grip of the lance?; is there a risk of the operator shooting himself with the lance?; is there a risk of an operator losing footing?; is there a risk of excessive reaction force to the operator?. The control measures would be the use of handles, mechanical systems without the direct involvement of the operator, hold to open devices and provision of nozzle charts to assist in determining the type of control required.

91. As for a risk assessment for the specific task Seta was doing, despite the number of Allied supervisory staff involved and the myriad of documents generated by both Allied and Blue Scope, no such process occurred. The

[34] Vol1 p 105

pre -work site inspection on 13 May 2008 involved three Allied supervisor/management staff and two Blue Scope staff. A documented risk assessment was not conducted.

92. When Mr Wray produced daily 'work packs' for Seta and his colleagues, a multitude of forms and documents were enclosed. They included a—
    . Job safety and environmental Analysis (JSEA) work sheet
    . Work Quality plan
    . work requisition form
    . tool box check list
    . safe operation of water jet procedure
    . safety audit check list
    . environmental audit check list

93. None of the documents addressed the fundamentals of a risk analysis for the specific task Seta was to carry out. The JSEA was generic in form and content. It made no reference at all to the basic steps of using a lance under high water pressure in the area that was to be cleaned, the corresponding risks and control measures.

94. Mr Nikoloski's view that the JSEA work sheet adequately identifies the hazards posed to the workers at the sediment tank site is indicative of a lack of understanding among some supervisors of the principles a formal risk assessment.[35]

95. Mr McCarthy said it was for the work crew to add any hazards that may not be part of the JSEA. Speaking of the job step plan that is among the paper work, Mr Mc Carthy said they, being the workers, write down the job steps, how they are going to perform the job, the hazards and the control of the hazards.[36] The view it fell on the workers is reinforced with the following comment—
    "You give them generic papers and then they've got to look at the job, assess the job and make some –put things down-if they're going to use a different piece of equipment, what hazards are those-do those pieces of equipment introduce".[37]

96. To require the labourers to create a written risk assessment when they had no more than a basic water blasting induction course and who according to Mr Lee, were not even given formal training on the use of a lance, were not trained on nozzles selection, not trained on how to determine reaction forces and whether they were exceeding a limit is in my view an abandonment of Allied's responsibilities.

97. The safety officer Mr Petrevski says the job pack was a form of risk assessment. It is hardly open to say the work pack and Safe Operating Procedure satisfies a risk assessment when sections of management were aware it was not being complied with in at least the fundamental issue of

[35] question 172
[36] t 22/4/12 p 110
[37] ibid p 113

the operator not having control of the water supply and there was no system to ensure workers were not exceeding the recommended reaction forces.

98. More disconcerting was the acknowledgement by Mr Petrevski that he would not be happy to see blasting with a lance without a trigger or a person other than the operator using a foot pedal or a lance without a handle. He said however they had no information at that point of time they weren't safe or inadequate.[38] This may be true if Allied does not conduct a proper risk assessment to find out the dangers or have a proper system to ensure compliance with its own safe operating procedures.

99. What emerges was an environment within Allied of form filing, box ticking, sign offs, authorisations and duplications whilst ignoring some fundamental safety issues and paying lip service to the need for caution in not exceeding a nominated level of reaction force.

**Issue 3. What changes need to be made to improve worker safety?**

100. Seta's death has in large measure generated significant change in work practices within the company and led to a review of the Australian Standard and a planned introduction of a Code of Practice. There are the two aspects to consider, the individual company, now known as Veolia and secondly, the wider industry.

101. Nr Nicholas' statement dated 18 April 2012 comprehensively details the response to the accident by Allied and Veolia. It has included—

. The removal of lances
. A review of water jetting operations, equipment and training
. Retraining of operators through an upgraded training package
. Conducting risk assessments and development of a new form of JSEA.
. Provision of Kevlar PPE
. A planning tool for first line managers that aims to identify if a task can be more effectively undertaken by automated equipment. The planning tool requires nomination of the operating pressure, type of equipment and whether mechanical restraint is required.
. Involvement in the review of the Australian Standard.

102. From the wider industry viewpoint, Standards Australia received in January 2010 a proposal from Ausjet for a review of the existing 1999 Standard. It was felt the Australian Standard needed to reflect current industry practices and technological advances since the initial development of the Standard. Meetings by interested parties have occurred and a technical committee will be established by Standards Australia to review the proposed changes.

[38] T p157

103. An important observation should be made concerning the review of the Australian Standard .The review should not be seen as an indication that the Standard was deficient and was somehow responsible for the death. The simple fact is that had Allied followed the Standard the accident would not have happened.

104. It is beyond the scope of this inquest to make recommendations or comment upon proposed changes to the Australian Standard. What are said by Mr Lee and Allied/Violea to be ambiguities in parts of the existing Australian Standard are more appropriately for referral by them to the Committee reviewing the Standard. Mr Stanbury has however suggested in his reports three matters –

    a. All lances have at least 1 handle, at least 1 “hold to open” device and there be at least 2 shut off devices operated by 2 people.
    b. There should be some caution in mandating the use of liquid resistant suits as they may in some cases increase risks to the worker.
    c. There should be a National training course.

105. Mr Stanbury said it is “vitally important that an industry wide level of competence is established and mandated”. I note that a representative of Standards Australia has attended this inquest and been provided with a copy of the brief and transcript. I will recommend that consideration be given by the Australian Standard’s committee to these findings.

106. The other notable advance of benefit to the wider industry is the development of a Code of Practice in relation to water jetting. Safe Work Australia is an Australian Government statutory agency with primary responsibility to improve work, health and safety. A Code of Practice is currently under development. It is anticipated it will be forwarded initially to WorkCover for checking in July and for subsequent public comment with a planned completion date by the end of 2012.

107. A Code of Practice explains how an organisation can achieve the standards required under the work health and safety legislation. It will identify the hazards in high pressure water jetting and how to manage the risks. A Code will be admissible in court proceedings as evidence of risks and control measures in water jetting that were reasonably practicable. A copy of these findings will also be forwarded to Safe Work Australia.

**An avoidable death**

108. It is clear from the personal statement given by Mrs Kolomaka the grief from the loss of her husband and father to their young children has been overwhelming. The inquest has no doubt caused further pain. But it has served an important purpose. The family and wider community are aware that Allied, now Violea has responded in significant ways to improve its work and safety processes. The workers in the water jetting industry will benefit from an anticipated Code of Practice and review of the Australian Standard.

109. In determining the manner of death, the inquest has shown at the very least to the family, that Seta and his colleagues were not departing from the normal method of using a water jet lance. Having another person in direct control of the water supply was the way it was done. Seta and his colleagues did not fail to follow a system of referral to a nozzle chart, determining a reaction force and the corresponding need for mechanical support. There was no such system.

110. Among the large number of documents generated for Seta's work were written work practices that recited the principles from the Australian Standard but in significant aspects were ignored among the most senior level in safety. Allied's own written safe operating procedure concerning the operator having direct control over the water supply in the type of work Seta was doing and not exceeding a reaction force level were largely meaningless words. Allied failed to provide some supervisors and workers with adequate training and education and failed to carry out a meaningful risk assessment on an inherently dangerous activity.

111. Simple and safe means for the work Seta was doing could have been used. It is not a case of unexpected technological advances in work practices after the death. Systemic failings within Allied led to a devastating outcome. This was on any view an avoidable death.

112. The Court extends to Seta's family its condolences for their loss.

**Finding**

113. Setaleki Sione Kolomaka died on 22 May 2008 at Blue Scope Steel Works, Port Kembla, New South Wales from traumatic injuries from a water jet when using high pressure water jetting equipment in the course of his work duties.

**Recommendations**

114. To the Director, Safe Work Australia
A copy of the findings and reports of Mr Stanbury are forwarded for their information in considering the establishment of a Code of Practice for Water Jetting.

115. To the Director, Standards Australia
A copy of the findings and reports of Mr Stanbury are forwarded for their information in considering the review of the Australian Standard concerning High Pressure Water Jetting.

**Ian Guy**
**Deputy State Coroner**
**Wollongong**
**20 June 2012**