

AUSTRALIA / JUDGMENT

SafeWork NSW v BOC Limited [2020] NSWDC 156

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District Court

New South Wales

Medium Neutral Citation: SafeWork NSW v BOC Limited [2020] NSWDC 156

Hearing dates: 13, 17, 20, 21, 25, 26, 27, 28 February 2020 and 06, 14 April 2020

Date of orders: 30 April 2020

Decision date: 30 April 2020

Jurisdiction: Criminal

Before: Strathdee, DCJ

Decision: 1. The prosecution has not proved all of the elements of the offence beyond reasonable doubt.

2. I will not enter final orders until the prosecution has had an opportunity to consider an application pursuant to s 5AE of the Criminal Appeal Act 1912 (NSW).
3. I will list the matter on 01 June 2020 to determine the appropriate course.

ADDENDUM

Final Orders Made on 01 June 2020

1. The prosecution has not proved all of the elements of the offence beyond reasonable doubt.
2. I find the defendant not guilty.
3. The Summons is dismissed.
4. I order the prosecution to pay the defendant's costs as agreed or assessed.
5. I return the exhibits.

Catchwords: CRIME – prosecution – work health and safety – duty of persons undertaking business – risk of death or serious injury to other persons

WORK HEALTH AND SAFETY – whether pleaded measures reasonably practicable – safety management system – objective knowledge of defendant – mere inadvertence or inattention – unforeseeable behaviour of a disobedient worker – falsification of records – reasonably foreseeable

OTHER – commissioning of works – cross-contamination of medical gases – babies exposed to nitrous oxide inadvertently

Legislation Cited: Criminal Appeal Act 1912 (NSW)

Occupational Health and Safety Act 2000 (NSW)

Work Health and Safety Act 2011 (NSW)

Cases Cited: Baiada Poultry Pty Ltd v R [2012] HCA 14

Bulga Underground Operations v Nash [2016] NSWCCA 37

Carrington Slipways Pty Ltd v Callaghan (1985) 11 IR 467

Director of Public Prosecutions v JCS Fabrications Pty Ltd and JMAL Group Pty Ltd [2019] VSCA 50

Dunlop Rubber Australia Ltd v Buckley (1952) 87 CLR 313

Genner Constructions Pty Ltd v WorkCover Authority of New South Wales [2001] NSWIRComm 267

Hamersley Iron Pty Ltd v Robertson (unreported WASC 2 October 1998)

Inspector Ching v Bros Bins Systems Pty Ltd [2004] NSWIRComm 197

Kirk v Industrial Relations Commission; Kirk Group Holdings Pty Ltd v WorkCover Authority of New South Wales (Inspector Childs) (2010) 239 CLR 531

Kirwin v Pilbara Infrastructure Pty Ltd [2012] WASC 99

Nash v Resource Pacific Pty Ltd (No. 3) [2018] NSWSC 45

Orr v Cobar Management Pty Ltd [2019] NSWDC 796

Orr v Hunter Quarries Pty Ltd [2019] NSWDC 634

R v Board of Trustees of the Science Museum [1993] 1 WLR 1171

R v Commercial Industrial Construction Group Pty Ltd [2006] VSCA 181

R v Nelson Group Services (Maintenance) Ltd [1998] 4 All ER 331

Royall v The Queen (1991) 172 CLR 378

SafeWork NSW v Grasso Consulting Engineers Pty Ltd; SafeWork NSW v Ignazio Grasso [2019] NSWDC 792

Slivak v Lurgi (Aust) Pty Ltd [2001] HCA 6

Theiss Pty Ltd v Industrial Court of New South Wales [2010] NSWCA 252

WorkCover Authority of New South Wales (Inspector Twynam-Perkins) v Maine Lighting Pty Limited (1995) 100 IR 248

WorkCover Authority of New South Wales v Kirk Group Holdings Pty Ltd (2004) 135 IR 166

WorkCover Authority of NSW (Inspector Egan) v Atco Controls Pty Ltd [1998] NSWIRComm 200

Texts Cited: Australian Standard 2896 'Medical Gas Systems – Installation and testing of non-flammable medical gas pipeline systems' (2011)

Category: Principal judgment

Parties: SafeWork New South Wales (Prosecutor)

BOC Limited (Defendants)

Representation: Counsel:

Mr J Agius SC and Mr D Jordan appeared for the Prosecutor

Mr B Hodgkinson SC and Mr Y Shariff appeared for the Defendant

Solicitors:

Department of Legal Services (Prosecutor)

Mary Azzi, Ashurst Lawyers (Defendant)

File Number(s): 2018/00218042

Publication restriction: None

Judgment

INTRODUCTION

1. BOC Limited ('the defendant') pleaded not guilty to a charge that being a person conducting a business or undertaking who had a health and safety duty under s 19(2) of the Work Health and Safety Act 2011('the Act') to ensure so far as is reasonably practicable that the health and safety of other persons is not put at risk from work carried out as part of the business or undertaking, did fail to comply with that duty and the failure to comply with that duty put at risk other persons, specifically baby Amelia Khan born 20 June 2016 and baby John Ghanem born 13 July 2016, to a risk of death or serious injury contrary to s 32 of the Act.

THE AGREED STATEMENT OF FACTS

1. The prosecutor tendered an Agreed Statement of Facts (Exhibit A) and an Agreed Tender Bundle (Exhibit B) which forms the basis of the background set out below.

BACKGROUND

1. The defendant is a registered corporation (ACN 000 029 729) which operates in the installation and maintenance of gas systems including medical, scientific and industrial gases. The defendant has operated since 18 January 1935 and carried out business under the name BOC Limited since 31 May 2002. As at April 2015 the defendant employed 1,792 employees.
2. In 2015, Mr Christopher Heasman ('Mr Heasman') was employed by the defendant as a Customer Engineering Services ('CES') technician. Mr Heasman's day-to-day duties included the maintenance and installation of the defendant's customer gas systems including in medical, hospitality, scientific and industrial systems. Mr Heasman continues to be employed in this capacity.
3. In 2015, Mr Paul Brightwell ('Mr Brightwell') was an employee of NSW Health, working with the SWSLHD and posted to BLH. In the period of 1 January 2015 to 1 August 2016, Mr Brightwell held the position of Assistant Engineer at BLH. His duties included overseeing the running of the Engineering Department of BLH and dealing with any issues that arose with project works.
4. Pro-Med Services Pty Limited ('Pro-Med') is a registered corporation which operates in the service and repair of medical equipment at hospitals. In 2015, Mr Christopher Turner ('Mr Turner') was the sole director and sole employee of Pro-Med. In 2015, BOC had a service agreement in place with Pro-Med.
5. The defendant required Mr Turner to complete online training modules in relation to medical gases.

THE HOSPITAL

1. Bankstown Lidcombe Hospital ('BLH') is a public hospital that operates as a part of the South Western Sydney Local Health District ('SWSLHD').
2. At all material times, BLH was the defendant's workplace and was a workplace for the purposes of s 8 of the Act.
3. BLH has operated from Elridge Road, Bankstown ('the premises') since approximately 1996. In 1996, the premises had been the subject of major renovations which included the installation of medical gas piping ('the 1996 renovations').

4. As at 2015, the premises included a maternity unit comprising ten neonatal cribs in a special care nursery with six birthing suites, which were supported by the hospital's eight operating theatres.
5. Approximately 2,220 babies are delivered at BLH each year.
6. BLH uses the eight operating theatres for all its surgical purposes, including as necessary for both planned and emergency caesarean section deliveries. Each of these operating theatres needs to be capable of undertaking neonatal resuscitation. Such resuscitation can require ongoing and uninterrupted supply of oxygen to a newborn baby.
7. Specialised neonatal resuscitation machines, known as 'Resuscitaire units', are transported to the operating theatres for use for warming newborn babies and/or clinical emergencies involving neonates. Prior to July 2015, the Resuscitaire units were supplied with medical gases from bottles mounted on the units. When in use, the mounted oxygen cylinders only lasted for approximately 15 minutes before they became empty.
8. In or about 2014, BLH sought to have piped medical oxygen, medical air, and suction installed into wall panels in the operating theatres to service the Resuscitaire units and in order to prevent the need to change oxygen bottles during neonatal resuscitation.

THE 1996 RENOVATIONS

1. As part of the 1996 renovations that took place at BLH (then known as Bankstown Hospital), Medical Gas Systems Pty Limited trading as Hoslab ('Hoslab') had managed the installation work of a piped medical gas system at the hospital.
2. In the process of the installation of the piped gas system, or at any time thereafter and prior to July 2015, a pipe containing and carrying medical nitrous oxide gas was mislabelled as medical oxygen.

THE WORK

1. On 12 April 2015, Mr Brightwell emailed the defendant requesting a quotation for the installation of piped medical oxygen, medical air, and suction into wall panels into each of the eight operating theatres at BLH ('the work').
2. On 17 April 2015, the defendant provided a quotation (Q18673) that detailed two price options for the work. One option was for a total cost of \$18,306.00. The second was for a total cost of \$22,356.00. Both options described the work as follows:
 1. Tee into existing suction, medical air and oxygen supplies in ceiling space of exit bay of theatre.
 2. Run supplies to a cavity within each theatre.
 3. Fit new three gang stainless steel flush mount panels.

4. Fit new oxygen, medical air and suction outlets.
5. Test and commission.
6. Repeat for all theatres.
1. The two pricing options differed only in the location of the cavity to which supplies would run.
2. Mr Brightwell did not seek a quotation from any other service provider.
3. The defendant was awarded the work at the agreed cost of \$18,306.00.
4. The defendant sub-contracted Pro-Med to undertake the work.
5. Mr Heasman was allocated to do the work by the defendant. Mr Bailey Simpson ('Mr Simpson'), an apprentice gasfitter hosted to BOC, was allocated by the defendant to assist both Mr Heasman and Mr Turner.
6. The work was scheduled by Mr Brightwell and the Nurse Manager Perioperative Services at BLH, Ms Eleanor Halvey, to take place over two nights; the night of 14 to 15 July 2015 and the night of 15 to 16 July 2015, and to be completed on the morning of 16 July 2015.
7. BLH required the installation work to be done during times when the operating theatres were not being used for scheduled operations; typically after 8:00pm. BLH required the overnight work to be completed by 7:00am the following day so the theatres could be cleaned and readied for surgical use at around 8:00am.
8. The work was to be split over two nights so that on each night, some of the operating theatres could be sterile, operative and available for emergency or unscheduled operations.
9. Immediately prior to the commencement of the work on 14 July 2015, Mr Turner, Mr Heasman and Mr Simpson were taken on a walkthrough of the operating theatres by Mr Brightwell and other staff from the hospital. At this time, discussions took place between Mr Turner, Mr Brightwell, Mr Heasman and Mr Simpson in relation to how the work was to be done and how to minimise the risks from the work. Some of the risks discussed were:
 1. Which theatres would be worked on first to keep the furthest away from the emergency operating theatres to minimise the risk of patient infection;
 2. Hot works, and minimising the risk of fire or alarm activation, including the requirement to do post-work monitoring;
 3. Working at a height; and
 4. Contamination.
1. Mr Heasman also noted that it was impractical for more than one person to work in the same roof space over the operating theatres at the same time.

2. On 14 July 2015, Mr Turner and Mr Heasman started the work. Mr Simpson worked between the theatres as required and directed by Mr Turner and Mr Heasman. Mr Simpson was jointly supervised by Mr Turner and Mr Heasman in the course of the work.
3. Mr Simpson's work was limited to cutting through the gyprock in the walls of the operating theatres to create space for the new panels to be mounted, fetching tools for Mr Heasman and Mr Turner from the work van, assisting Mr Turner and Mr Heasman when required and assisting in cleaning up. Mr Simpson did not enter the roof space of any operating theatre, or in particular operating theatre 8 ('OT8'), to perform any installation work.
4. On the night of 14 to 15 July 2015, the pipe work installation and connection work for OT8 was completed.
5. An oxygen pipe label was affixed to one of the new pieces of pipework leading into the panel and an oxygen outlet was affixed to that pipe.
6. Mr Turner and Mr Brightwell signed a BOC Medical Gas Outlet Test Form (Exhibit E), a Test Certificate Form T1, a Test Certificate Form T2, a Test Certificate Form T5, a Test Certificate Form T6, and a Contract Completion Certificate T9 (Exhibit D) all dated 15 July 2015 which recorded the test results for each of the oxygen, air and suction outlets in each of operating theatres 1 to 8.

THE INCIDENTS

1. OT8 was operational after receipt of the certification that the work had been properly completed and tested on 16 July 2015.
2. On 20 June 2016, baby Amelia Khan required resuscitation following delivery. She was administered medical nitrous oxide from the neonatal resuscitation medical gas system in OT8, thought at the time by those administering gas to her to be medical oxygen from the port labelled 'oxygen'.
3. Amelia Khan sustained serious injuries including hypoxic ischaemic encephalopathy (brain damage due to lack of oxygen), symptomatic epilepsy and vision impairment.
4. At 11:54am on 13 July 2016, baby John Ghanem was born in OT8 and required resuscitation following delivery. During his attempted resuscitation, John Ghanem was ventilated with medical nitrous oxide from the neonatal resuscitation medical gas system in OT8, thought at the time by those administering gas to him to be medical oxygen from the port labelled 'oxygen'. John Ghanem died at 12:51pm on 13 July 2016.
5. John Ghanem's death, and the serious injuries sustained by Amelia Khan, occurred after having been administered medical nitrous oxide instead of medical oxygen from the medical gas system.
6. Use of OT8 was suspended by BLH on 21 July 2016.

7. On 21 July 2016, testing by Hoslab recorded that in OT8, the outlet labelled 'oxygen' on the neonatal resuscitation panel was delivering 0% oxygen and was, in fact, delivering nitrous oxide gas.

8. The particulars of the alleged failures contained in the Summons are as follows:

'13. The defendant failed to ensure so far as is reasonably practicable the health and safety of other persons, in particular the babies, in that it failed to take one or more of the following reasonably practicable measures to eliminate (or alternatively minimise if not reasonably practicable to eliminate) the risks to health and safety to other persons:

- (a) Conducting (or arranging for a suitably qualified person to conduct) a risk assessment prior to undertaking the work which identified the hazards and risks associated with the work. In particular, a risk assessment would have:
 - (i) Identified the risks associated with undertaking the work, including the risk of cross connection of the pipes;
 - (ii) Assessed the identified risks;
 - (iii) Identified the most appropriate work methods for undertaking the work; and
 - (iv) Identified the most appropriate control measures for undertaking the work;
- (b) Developing and implementing a Safe Work Method Statement ('SWMS') or having a safe work procedure for the work which complied with Australian Standard AS 2896-2011 Medical Gas Systems – installation and testing of non-flammable medical gas pipeline systems ('the Standard') and which required:
 - (i) Connection of the port to the existing pipework to be undertaken in only one gas system at a time to minimise the risk of cross-connection; and/or
 - (ii) Testing by a designated person to determine that the concentration of oxygen was correct and that there was no contamination; and/or
 - (iii) The testing referred to in subparagraph (ii) above to be conducted:
 - In the presence of a member of BLH experienced in the administration of medical gases to patients; or
 - By the anaesthetist in charge or a delegated anaesthetist;
- (c) Ensuring that any contractors engaged by BOC to conduct the work are provided with the SWMS or safe work procedure set out in (b) above or ensuring that the contractor has its own SWMS or safe work procedure which complies with the Standard in the manner set out at (b) above;
- (d) Providing instruction, information and training to workers, in particular Mr Heasman and Mr Turner in the SWMS or safe work procedure;

- (e) Instructing workers, in particular Mr Heasman and Mr Turner, that testing should be undertaken at the completion of the work and, in particular, that the testing should:
 - (i) Determine the identity of the gas being emitted from the new ports was correct by performing a cross-connection test;
 - (ii) Determine the concentration of oxygen being emitted from the new ports was correct and that there was no contamination; and
 - (iii) Be conducted in the presence of a member of BLH experienced in the administration of medical gases, or
 - (iv) Be conducted by the anaesthetist in charge or a delegated anaesthetist.
- (f) Instructing workers, in particular Mr Heasman and Mr Turner, that the testing referred to in (e) above should not be undertaken in the absence of a member of BLH experienced in the administration of medical gases or an anaesthetist;
- (g) Requesting BLH to provide one of its members experienced in the administration of medical gases to patients is to be present and to witness the testing and certification of the port referred to in paragraph (e)(ii) above;
- (h) In the alternative to (f) above, requesting BLH to provide the anaesthetist in charge or a delegated anaesthetist to perform the testing referred to in paragraph (b)(iii) above.'

THE ELEMENTS OF THE OFFENCE

1. The prosecution bears the onus of proving beyond reasonable doubt the elements of the offence.
2. Section 32 of the Act provides:

'A person commits a Category 2 offence if:

- (a) the person has a health and safety duty, and
- (b) the person fails to comply with that duty, and
- (c) the failure exposes an individual to a risk of death or serious injury or illness.'

1. The elements of the offence are:

Element 1 The defendant was conducting a business or undertaking;

Element 2 The defendant owed a health and safety duty to not put at risk, so far as was reasonably practicable, the health and safety of the babies under s 19(2) of the Act;

Element 3 The defendant failed to comply with that duty; and

Element 4 The failure put the babies at a risk of death or serious injury.

THE RELEVANT LAW

1. The offence is one of strict liability: s 12A of the Act.
2. A person is a "worker" if the person carries out work in any capacity for a person conducting a business or undertaking, including work as an employee, a contractor or a sub-contractor or an employee of a contractor or subcontractor: s 7 of the Act.
3. The duty provided for by the Act is not transferrable: s 14 of the Act. More than one person can concurrently have the same duty and each duty holder must comply with that duty to the standard required: s 16 of the Act.
4. If more than one person has a duty in relation to the same matter under the Act, each duty holder must, so far as is reasonably practicable, consult, co-operate and co-ordinate activities with all other duty holders in relation to the same matter: s 46 of the Act.
5. A duty holder must have a structured and systematic approach to risk management: *Inspector Ching v Bros Bins Systems Pty Ltd* [2004] NSWIRComm 197 at [32] per Marks J.
6. It is not disputed that the defendant was a PCBU pursuant to s 5 of the WHS Act. As such the defendant had a duty to 'ensure, so far as is reasonably practicable, that the health and safety of other persons is not put at risk from work carried out as part of the conduct of the business or undertaking': s19(2) of the Act.
7. The PCBU must, so far as is reasonably practicable, consult with the workers who are to carry out work for the business or who are likely to be affected by a health or safety matter: s 47 of the Act. Consultation includes sharing relevant information with the workers, giving them a reasonable opportunity to express their views and to contribute to the decision making process, taking into account the workers' views and advising them of the outcome of the consultation process in a timely manner: s 48 of the Act. Consultation is required, inter alia, when identifying hazards and assessing risks to health and safety from the work and making decisions about ways to eliminate or minimise those risks: s 49 of the Act.
8. The defendant does not dispute, in factual terms, that it contracted with the area health service to perform the work, that during the work the new oxygen outlet in OT8 was connected to the nitrous oxide line in error, that the certification and commissioning process of the installation was not correctly performed, and that if that process had been correctly performed the error would have been detected prior to its use.
9. The defendant disputes that it failed to comply with its health and safety duty, and that the failure(s) put persons, and in particular the babies, to a risk of death and serious injury.
10. The content of the duty is contained within s 19 of the Act, as follows:

'Primary Duty of Care

19 (1) A person conducting a business or undertaking must ensure, so far as is reasonably practicable, the health and safety of:

- (a) workers engaged, or caused to be engaged by the person, and
 - (b) workers whose activities in carrying out work are influenced or directed by the person, while the workers are at work in the business or undertaking.
- (2) A person conducting a business or undertaking must ensure, so far as is reasonably practicable, that the health and safety of other persons is not put at risk from work carried out as part of the conduct of the business or undertaking.
- (3) Without limiting subsections (1) and (2), a person conducting a business or undertaking must ensure, so far as is reasonably practicable:
- (a) the provision and maintenance of a work environment without risks to health and safety; and
 - (b) the provision and maintenance of safe plant and structures, and
 - (c) the provision and maintenance of safe systems of work, and
 - (d) the safe use, handling, and storage of plant, structures and substances, and
 - (e) the provision of adequate facilities for the welfare at work of workers in carrying out work for the business or undertaking, including ensuring access to those facilities, and
 - (f) the provision of any information, training, instruction or supervision that is necessary to protect all persons from risks to their health and safety arising from work carried out as a part of the conduct of the business or undertaking, and
 - (g) that the health of workers and the conditions at the workplace are monitored for the purpose of preventing illness or injury of workers arising from the conduct of the business or undertaking.'
1. The principles applicable to prosecution of offences under the Act have been summarised in recent decisions including *Orr v Cobar Management Pty Ltd* [2019] NSWDC 796; *Orr v Hunter Quarries Pty Ltd* [2019] NSWDC 634 and *SafeWork NSW v Grasso Consulting Engineers Pty Ltd*; *SafeWork NSW v Ignazio Grasso* [2019] NSWDC 792.
 2. It is incumbent upon the prosecution to prove that the act or omission of the defendant was a significant or substantial cause of a person being exposed to the risk of injury: *Bulga Underground Operations v Nash* [2016] NSWCCA 37 at [130] per Bathurst CJ, Hidden and Davies JJ. The question, however, is one to be determined by the application of common sense to the facts, bearing in mind that the purpose of the inquiry is to attribute legal responsibility in a criminal matter.
 3. The requirement to 'ensure' means to guarantee or make certain: *Carrington Slipways Pty Ltd v Callaghan* (1985) 11 IR 467 at 470.

4. The safety of a worker or person cannot be ensured if a risk to their health and safety exists. The simple existence of the risk constitutes a breach of s 19 of the Act. It matters not that there was an accident or that a person was injured: *Kirk v Industrial Relations Commission; Kirk Group Holdings Pty Ltd v WorkCover Authority of New South Wales (Inspector Childs)* (2010) 239 CLR 531 at [13] per French CJ, Gummow, Hayne, Crenna, Kiefel and Bell JJ. The relevant risk for the commission of the s 32 offence is the risk of death or serious injury.
5. The relevant question is not whether the particularised failures of the defendant were the cause of the death or injury, but rather whether there was a causal relationship between the act or omission and the risk to which a worker was exposed: *Bulga Underground Operations* (supra).
6. The word 'risk' is not defined in the Act. Risk means the mere possibility of danger and not necessarily actual danger: *R v Board of Trustees of the Science Museum* [1993] 1 WLR 1171 and *Theiss Pty Ltd v Industrial Court of New South Wales* [2010] NSWCA 252 at [67] per Spigelman CJ.
7. Reasonably practicable is defined in s 18 of the Act. The reasonably practicable requirement applies to matters which are within the power of the defendant to control, supervise and manage: *Slivak v Lurgi (Aust) Pty Ltd* [2001] HCA 6 at [37] per Gleeson CJ, Gummow and Hayne JJ.
8. The phrase 'exposed to risks' contained in s 8(2) Occupational Health and Safety Act 2000 (NSW) was interpreted to mean that a person was sufficiently proximate to the source of a risk for the risk to come home, irrespective of the mechanism by which that could happen: *Theiss* (supra).
9. The s 19 duty requires knowledge of the risk emanating from the activities of the defendant: *Slivak* (supra). Foreseeability of the risk to persons from the activity is an element of this question of knowledge. It would not generally be practicable to take measures to guard against a risk to safety that was not reasonably foreseeable: *Genner Constructions Pty Ltd v WorkCover Authority of New South Wales* [2001] NSWIRComm 267 at [68].
10. In *Inspector Ching v Bros Bins Systems Pty Ltd* [2004] NSWIRComm 197 at [32] per Marks J it was held that a duty holder must have a structured and systematic approach to risk management.
11. The words "reasonably practicable" indicate that the duty does not require an employer to take every possible step that could be taken: *Baiada Poultry Pty Ltd v R* [2012] HCA 14. Simply demonstrating that a step could have been taken and that, if taken, it might have had some effect on the safety of a working environment does not, without more, demonstrate that an employer has broken the duty: *Baiada* (supra) at [15] and [38] per French CJ, Gummow, Hayne, Heydon and Crennan JJ.

12. In *WorkCover Authority of New South Wales (Inspector Twynam-Perkins) v Maine Lighting Pty Limited* (1995) 100 IR 248 at 257, Bauer J stated as follows:

"The very purpose of the Act was to introduce safe working practices so that accidents are prevented. The Act was designed to protect against human errors including inadvertence, inattention, haste and even foolish disregard of personal safety as well as the foreseeable technical risks in industry."

1. The question of reasonably practical is also a question of fact, dependant on the circumstances of each case. The fact that an employee has carried out work carelessly or omitted to take a precaution does not preclude the employer from establishing that everything that was reasonably practicable in the employer's undertaking to ensure that persons were not exposed to risks to their health and safety had been done: *R v Nelson Group Services (Maintenance) Ltd* [1998] 4 ER 331 at 351.
2. It is accepted law that one of the matters that PCBUs must recognise and plan for is the inevitability of human error ranging from inadvertence, inattention or haste through to foolish disregard of personal safety and deliberate non-compliance with safe systems of work: *R v Commercial Industrial Construction Group Pty Ltd* [2006] VSCA 181 at [49] and *Director of Public Prosecutions v JCS Fabrications Pty Ltd and JMAL Group Pty Ltd* [2019] VSCA 50 at [51].
3. In *Kirwin v Pilbara Infrastructure Pty Ltd* [2012] WASC 99 and *Nash v Resource Pacific Pty Ltd (No. 3)* [2018] NSWSC 45 at [423]-[429], it was held that the use of an independent contractor with specialist skills or knowledge is a relevant consideration. If reliance is placed on an independent specialist contractor to perform a task that would demonstrably be within the independent contractor's area of expertise, it would not ordinarily be practicable for the contractor to do more, provided the task undertaken reasonably appeared to have been carefully and safely performed by the independent contractor: *Hamersley Iron Pty Ltd v Robertson* (unreported WASC 2 October 1998) per Steytler J.
4. A duty holder must have regard to not only the ideal worker, but also for one who is careless, inattentive or inadvertent: *Dunlop Rubber Australia Ltd v Buckley* (1952) 87 CLR 313 at 320 per Dixon CJ. Whilst it is not always possible to foresee various inadvertent actions by workers, duty holders nonetheless must conduct operations on the basis that such acts will occur and they must be guarded against: *WorkCover Authority of New South Wales v Kirk Group Holdings Pty Ltd* (2004) 135 IR 166 at [129].
5. In *WorkCover Authority of New South Wales v Kirk Group Holdings Pty Ltd* (supra) it was held that the unforeseeable behaviour of a disobedient worker may well lead to the happening of an event that could not be reasonably foreseen and therefore was not reasonably practical to guard against.

6. The relevant question on causation is whether the act or omission of the defendant was a significant or substantial cause of the exposure to the risk of injury: *Bulga Underground Operations v Nash* (supra) at [127]. Further, the relevant question is not whether the particularised failures of the defendant were the cause of the injury to the worker, but whether there was a causal relationship between the act or omission and the risk to which the worker was exposed: *Bulga* (supra) at [130].
7. The application of common sense must be featured in the determination of the question of causation, bearing in mind that the purpose of the enquiry is to attribute legal responsibility in a criminal matter: *Royall v The Queen* (1991) 172 CLR 378.
8. Section 275 of the Act provides that an approved code of practice is admissible in proceedings for an offence against the Act as evidence of whether a duty under the Act has been complied with. The Court may have regard to the code as evidence of what was known about a risk, or the measures available to control a risk, and they may rely on the code to determine what is reasonably practicable in the circumstances to which the code relates.

GUIDANCE MATERIAL – AUSTRALIAN STANDARD AS2896

1. The Australian Standard applicable to the work is AS2896 'Medical Gas Systems – Installation and testing of non-flammable medical gas pipeline systems' ('The Standard'). The Standard has been revised and updated several times in the past 30 years with the latest release in 2011.
2. The Standard sets out the requirements for the safety aspects, construction, testing and certification as well as operation and maintenance of non-flammable medical gas pipelines used for patient care.
3. Clause 4.13.1 of the Standard requires that connections to existing systems shall be undertaken on only one gas system at a time to minimise the risk of cross-connection.
4. Clause 4.13.2 of the Standard requires that where an addition is made to an existing system, the new pipeline shall have an air-break during construction, with the existing system.
5. Clause 5.1 of the Standard requires that the testing and commissioning of medical gas systems must be carried out and must include a check for cross-connection in the pipeline. Clause 5.2 of the Standard requires that with cross-connection testing a member of the health care facility shall be present to verify the testing.
6. Clause 5.6.5.1 provides that tests for gas concentration shall be carried out as specified in Clause 5.6.5.2. Clause 5.6.5.2 states that each terminal unit on each system shall be checked to verify the nominal concentration of the gas. The specified concentration for oxygen and nitrous oxide are $\geq 95\%$ and $< 5\%$ respectively.

7. Clause 5.6.5.1 also provides that whenever a new medical gas piping system is installed or a major addition is installed from an existing system, a test for gas contamination shall be carried out. The work at BLH was a major addition from an existing system.
8. Clause 5.7 provides for operational testing. Clause 5.7.1 specifies that a 'member of the healthcare facility experienced in administration of medical gases to patients, and such other persons as are required by the administration of the health care facility, shall be present and witness the test.' Clause 5.7.1 further provides that where 'non-respirable medical gases, e.g. nitrous oxide' are piped, tests 'shall be performed by the anaesthetist in charge or a delegated anaesthetist', and that certificates 'shall be dated and signed by all who have witnessed the tests'.
9. The following witnesses were called by the prosecution, and all apart from Mr Clifton gave oral evidence before me in Court. Mr Clifton gave his evidence by telephone over two days.

ALEXANDRA ROWE

1. Alexandra Rowe ('Ms Rowe') was called, and gave evidence that she was a Safety Inspector with SafeWork NSW. Ms Rowe attended at BLH on 1 August 2016 and 18 August 2016 to take a number of photographs of OT8 and the outlet of the pipe labelled 'oxygen' through which nitrous oxide was led (Transcript p19-20). These photographs comprise part of the agreed tender bundle (Exhibit A).

ELEANOR HALVEY

1. Eleanor Halvey ('Ms Halvey') was called and gave evidence that she was the nurse manager of perioperative services at BLH, a position which she held as at July 2015. Ms Halvey attested to the order of works on the evenings of 14 to 15 July 2015 and 15 to 16 July 2015, with reference to an email sent by her to staff at Bankstown Hospital on 14 July 2015 setting out which operating theatres were scheduled to be worked on each night (Exhibit C, Transcript p24). She stated that it was usual hospital procedure for work on operating theatres to be performed at night, outside of the regular theatre operating hours (Transcript p32). Ms Halvey gave evidence that on the night of 14 to 15 July 2015, the operating theatres that were to be worked on – in order – were theatres 6, then 8, then 7, then 5 (Transcript p24). Ms Halvey also gave evidence that the order in which the work was to be done was discussed with BOC representatives prior to 14 July 2015, though she was not able to say whether those representatives were Mr Heasman, Mr Bailey or Mr Turner or any other worker onsite during the evening work (Transcript p25). Ms Halvey was not present in the evenings when any of the work was done, though was notified by the Nursing Unit Manager and Mr Brightwell on 15 July 2015 that the work had been completed and she was aware that operating theatres 5, 6, 7, and 8 were available to be, and were, used on that day (Transcript p26-27). Ms Halvey gave evidence that Mr Brightwell was the designated person from within BLH who was responsible for organising the initial quotation for the work from BOC and to get the work done if it was approved (Transcript p32-33). Ms Halvey said that Mr Brightwell

was involved from the commencement of consideration of the project through to its delivery and was responsible for meeting with the BOC staff on the night of the work (Transcript p33, 34).

BAILEY SIMPSON

1. Mr Simpson was called and gave evidence that as at July 2015, he was a first-year apprentice gasfitter with BOC. Mr Simpson gave evidence that he was only interviewed by police in October 2016, approximately one year and three months after the work was completed, and as such his memory of the work carried out from 14 to 16 July 2015 was not particularly strong (Transcript p42-43). Mr Simpson said that during the work at BLH, the only tasks he performed were cutting holes in the operating theatre walls for the metal panels to be fitted, fetching tools, and other general tasks as instructed by Mr Heasman and Mr Turner (Transcript p42). He said that at no time did he enter or work in the ceiling space (Transcript p42). Mr Simpson gave evidence that Mr Heasman and Mr Turner worked on separate theatres and he worked on cutting the wall in the theatre in which Mr Heasman was working first (Transcript p49, 50).
2. Mr Simpson gave evidence that, to the best of his recollection, he did not see the document entitled 'Customer Service Report' (Exhibit B, p27), though he said that it was usual practice for him to have seen, read and signed a customer service report on a job (Transcript p46).

CHRISTOPHER HEASMAN

1. Mr Heasman was called and gave evidence that as at 2015, he was employed as a technician with BOC and had been employed with BOC for approximately 10 years. Mr Heasman is a trade qualified boilermaker. Mr Heasman gave evidence that he was contacted by the police to provide a statement on 7 October 2016 and had no reason to cast his mind back to the works on 14 to 16 July 2015 prior to that date (Transcript p57). Mr Heasman said that he was not made aware, to the best of his recollection, that OT8 was the theatre in which the incidents occurred prior to making his statement to police (Transcript p57).
2. Mr Heasman gave evidence that as at July 2015, he was genuinely aware of the Australian Standards that applied to the work that he did (Transcript p56). He said that he was confident that he knew the nature of the work and had the training and experience to complete the work (Transcript p141).
3. Mr Heasman had not worked with Mr Turner prior to this job (Transcript p59). He was advised by his manager that Mr Turner was given a job and he was asked if he could 'give him a hand to put some plug work in as he [Mr Turner] was in between jobs' and was told 'that we were going to give him a hand to install some gas lines in the operating theatres at Bankstown Hospital' (Transcript p58-59).

4. On the evening of 14 July 2015, Mr Heasman said that he met up at BLH with Mr Turner, Mr Simpson, Mr Brightwell and the nursing unit manager he identified as 'Eleanor' (Transcript p61).
5. Mr Heasman gave evidence that whilst there was a discussion between he and Mr Turner about the work, there was no discussion as to who was 'in charge' of the work, and Mr Turner and Mr Heasman did not instruct the other how to do the work. Mr Heasman was told from the start by Greg Allen, his line manager, that the job was given to Mr Turner (Transcript p64, 140-141). Mr Heasman gave evidence that at no time during the work did Mr Turner ask him how to perform any aspect of the work, nor what the requirements of the work were (Transcript p141).
6. Mr Heasman gave evidence that at no time prior to or during the work did he see or sign the document entitled 'Customer Service Report' (Exhibit B, p27), and was at no time inducted into the document. Mr Heasman, when asked specifically, said that he should have been inducted into the form (Transcript p99). Mr Heasman said that he never saw a SWMS, safe work form, nor risk assessment for the work done at BLH in July 2015 (Transcript p99). Mr Heasman gave evidence that there were no discussions prior to or during the work at BLH in July 2015 about the risk of harm to people being resuscitated if any errors had been made in the work nor a document that set out the Australian Standard as it related to the work (Transcript p100).
7. Mr Heasman said he did not recall being requested to carry out the work in a specific order (Transcript p63). He gave evidence that Mr Turner commenced work on the pipework of OT8 whilst he and Mr Simpson worked inside the theatre, Mr Heasman demonstrating to Mr Simpson how to cut the walls on the operating theatre for the area in which the panels were to be inserted (Transcript p65, 66-67). After he had worked with Mr Simpson on the wall in OT8, Mr Heasman said that he moved to operating theatre 7 to begin working on the pipework (Transcript p65). Mr Heasman gave evidence that once he had finished working on operating theatre 7, he moved to operating theatre 5 and worked on the pipework there. Mr Heasman said that after working on OT8, Mr Turner worked on operating theatre 6 (Transcript p65). Mr Heasman could not recall the order in which he worked on the operating theatres for the second shift (Transcript p65).
8. When specifically asked, Mr Heasman said that it was not possible that Mr Turner in fact started on operating theatres 7 or 6 and not on operating theatre 8 (Transcript p65). Mr Heasman, when asked specifically whether the work was done in accordance with Ms Halvey's schedule (Exhibit C), said that he did not recall being told that order and specifically remembered 'starting at one end, theatre 8, and we worked our way down' (Transcript p66).

Mr Heasman's Work Procedure

1. Mr Heasman stated that the procedure he followed when he worked on the operating theatres at BLH was:

* He turned off the gases to be worked on at the valve box, though only those that were connected to the theatre to be worked on;

* He bled down the gas line he would be working on;

* He went into the ceiling, working from a ladder, and cut the new pipeline in for that gas; and

* Repeated as necessary for the other pipes (Transcript p73, 133-134).

1. Mr Heasman gave evidence that if the valve at the valve box, be it oxygen, medical air, or nitrous oxide, in any of the operating theatres worked on at BLH was turned off, the gauge above each valve handle that measured the downstream pressure of the valve would not drop to zero (Transcript p72-73). The valve would continue to show the pressure of what was left in the pipe downstream of the valve (Transcript p73). The pipes were not able to be 'bled' (the gas removed from the pipe) from the valve outlet at the wall of the operating theatres, they were bled elsewhere (Transcript p73).
2. Mr Heasman gave evidence that while he never asked Mr Simpson to turn off any valves for him, he may have asked Mr Simpson to depressurise a line for him to save Mr Heasman from having to come down from the ladder (Transcript p148-149).
3. Mr Heasman gave evidence that the process for cutting through a gas pipe involves using a circular tool that cuts around the outside of the pipe, known as a pipe cutter, as opposed to straight through the pipe (Transcript p110, 123, note Exhibit 2). Mr Heasman said should a worker cut into the incorrect pipe, which would initially be a small cut when using a pipe cutter, the worker would hear and feel the release of gas (Transcript p110). Mr Heasman gave evidence that, in his experience, he has never cut into a pipe that was pressurised to 415 kPa and not heard gas escaping (Transcript p125).
4. Mr Heasman maintained that whilst he would turn all the valves off for all of the gases he would be working on, he would not bleed all of the gases down at the same time, only the gas he was working on (Transcript p73, 82). Mr Heasman gave evidence that he did not believe that only shutting down (at the valve) the gas that was being worked on (say, oxygen) was safer than shutting down all of the gases that were proposed to be worked on (say, oxygen, medical air and suction) (Transcript p103). Mr Heasman gave evidence that even if all of the pipes proposed to be worked on were shut down at the valve at the same time, gas pressure would still remain in the pipes. When the gas that was being worked on (say, oxygen) was bled down at the valve, in the event that you cut into the incorrect pipe (say, medical air), the remaining gas pressure in the pipe would leak out, indicating to the worker that they have cut into the medical air pipe instead of the oxygen pipe (Transcript p104). Mr Heasman said that he did not understand the Australian Standard to require that only the line that the worker was intending to cut into to be shut down at the valve (Transcript p104).

5. Mr Heasman said in following the above procedure, if he had been working on the oxygen line, and cut into a pipe in the ceiling that was mistakenly labelled oxygen when it was in fact nitrous oxide, he would have noticed gas leaking from the pipe (Transcript p135). Mr Heasman confirmed that if he had utilised his procedure and there had been a cross-connection, it would have been obvious to him straight away (Transcript p136).
6. Mr Heasman also gave evidence that the function of bleeding down a line that had been previously turned off at the valve was to depressurise the remaining amount of gas in the area between the valve and the operating theatre (Transcript p136). He said that by turning off at the valve only those gases that were to be worked on (say, oxygen, medical air and suction), if he subsequently went to bleed one line (say, oxygen) that had been mislabelled and in fact contained nitrous oxide, the gas would continue to flow from the source and would not empty (Transcript p137).
7. Mr Heasman gave evidence that after he had turned the gases off at their valves and when he was bleeding the pressure down on the oxygen line, an alarm would go off, which he would then mute (Transcript p142). In the event that he was bleeding down a gas that hadn't been turned off at the valve, no alarm would sound as the pressure would be maintained in the pipe as it would feed from the source, rather than bleed and empty (Transcript p143). If he did not hear an alarm when he bled down the gas, he would be alerted to the fact that there might be a problem (Transcript p144).
8. Mr Heasman conceded in re-examination that, in circumstances where a nitrous oxide pipe was inadvertently labelled oxygen, if someone had turned off the nitrous oxide valve as well as the oxygen, medical air and suction valves and then bled down all of the pipes and cut into the pipe labelled oxygen (though containing nitrous oxide), there would be no indication that the wrong gas pipe was being cut into.
9. After the new pipework was put in place, Mr Heasman said that he then turned each gas line on individually at the valve to ensure that the gas was being led from the correct line to the correct outlet (Transcript p84). Mr Heasman said that after he turned one line of gas on (for instance, oxygen) he checked the other outlets (for instance, suction and medical air) to ensure that no gas was being incorrectly led to those outlets from the oxygen line (Transcript p84-85). Mr Heasman then left the first gas line on (for instance, oxygen), and then turned on the valve for the second gas line (for instance, medical air) and checked the outlet pressure to ensure gas was being led to the medical air outlet (Transcript p85), and repeated this process for the last gas line (for instance, suction). Mr Heasman said any cross-connection would be evident to him at this stage (Transcript p138). Mr Heasman gave evidence that at this stage, he would not conduct a gas identity test, because he would expect that this test would be done in pre-commissioning and then again in commissioning (Transcript p86).

10. During cross-examination, Mr Heasman gave evidence that when he had completed work on one theatre, he taped over the newly installed outlets to indicate that they could not be used. Whilst he said it was usual practice for him to put a tag on the outlets with the message 'do not use' or 'out of service', he could not clearly recollect placing such a tag on the outlets on this occasion (Transcript p139). Mr Heasman conceded in re-examination that he never told the police or anybody from SafeWork NSW who was investigating this matter that he had put tape over any of the newly created nozzles in any of the operating theatres after the work was completed (Transcript p151).
11. Mr Heasman said that he did not notify anyone at the hospital that the operating theatres that had been subject to the work could not be used until the formal commissioning process took place (Transcript p150).

Commissioning and Pre-commissioning

1. Mr Heasman gave evidence that pre-commissioning was typically conducted at the end of the work, but before final commissioning, to satisfy the worker that the new piping was correct before they would engage the hospital for final commissioning (Transcript p86). Mr Heasman said that this was a procedure he learnt whilst working at BOC (Transcript p87).
2. Mr Heasman gave evidence that he did not conduct any pre-commissioning or commissioning for the BLH work (Transcript p87). Mr Heasman said that Mr Turner advised him that he 'was coming back to do the commissioning' and he observed that Mr Turner had a commissioning kit with him (Transcript p87). Mr Heasman rejected the proposition that he asked Mr Turner to return to do the commissioning (Transcript p87). Mr Heasman gave evidence that any time up until the point that he left he did not see Mr Turner doing anything that he would expect to see being done if pre-commissioning or commissioning were taking place, nor did he see a copy of any commissioning forms from Mr Turner (Transcript p90).
3. When shown the medical gas test forms completed by Mr Turner (Exhibits D and E), Mr Heasman said that with the exception of the figures for pressure drop recorded for operating theatre 5, none of the test results for operating theatres 1, 2, 3, 4, 6, 7, or 8 were out of the ordinary or questionable (Transcript p98).
4. Mr Heasman gave evidence that in the event that a nitrous oxide pipe was mistakenly cut into and led down to an oxygen outlet, the tests in the testing certificates (Exhibits D and E) that would indicate that nitrous oxide was coming out of the oxygen were the cross connection test (T1 part 2) and the gas purity test (T1 part 12) (Transcript p130). Mr Heasman gave evidence that if either of those two tests had failed, either in pre-commissioning or commissioning, he would not be able to hand the installation work over to the hospital for it to be used (Transcript p131).

Mr Heasman's Training and Experience

1. Mr Heasman gave evidence that whilst working with BOC and prior to the work at BLH in July 2015, he had received training in relation to the installation requirements for medical gas pipelines, vacuums and scavenging systems including training in the requirements mandated by the Australian Standard (Transcript p126). This training was provided through an online system known as 'Traccess', which requires the users to complete units by reading learning materials and then passing a test (Transcript p127). Mr Heasman said that the second aspect of the training provided by BOC is peer-to-peer on the job training provided by more experienced employees to younger or more inexperienced employees (Transcript p127).
2. Mr Heasman gave evidence that due to his training prior to the work in July 2015 at BLH he was aware that:

* it was important to avoid cross-connection between the gas pipes as the gases were to be administered to patients;

* none of the gas outlets involved in installation could be used by the hospital before the work was commissioned;

* it was necessary to check the gas purity of the newly installed oxygen lines; and

* the testing that was recorded in the commissioning forms had to be witnessed by somebody from the hospital (Transcript p128-129).

PAUL BRIGHTWELL

1. Mr Brightwell was called who gave evidence that, as at July 2015, he held the position of assistant engineer at BLH. He had held this role since approximately 2013 (Transcript p171). In this role, he supervised all of the employees who worked in the engineering department (Transcript p171). Mr Brightwell is a trade qualified fitter and machinist (Transcript p168). As at July 2015, Mr Brightwell did not hold any professional engineering qualifications (Transcript p169). Mr Brightwell, as at July 2015, had no experience in the administration of gases to patients nor had he been involved in the testing of a medical gas delivery system in a hospital context (Transcript p170).

Mr Brightwell's Role and Responsibilities

1. Mr Brightwell gave evidence that it was his responsibility to manage physical works to the hospital by seeking quotations, hiring appropriate contractors, ensuring that they were able to access the hospital and do the works whilst managing the conditions and requirements of the hospital, and then finally receiving the handover of the work at completion (Transcript p188-189). The requirement for handover occurred for all contractors for all kinds of work (Transcript p190). Mr Brightwell gave evidence that handover involved ensuring that the work that was to be performed had in fact been performed and the area on which works had

been performed was in a workable, serviceable state when it was handed to the hospital, and it was his responsibility, if these standards weren't met, to reject the handover and have the contractor fix it (Transcript p190).

2. Mr Brightwell gave evidence that it was his responsibility as the head of engineering to make sure that the requirements of the hospital in relation to the operation of the oxygen system were being met throughout the hospital (Transcript p192). Mr Brightwell gave evidence that he had engaged contractors from BOC to carry out maintenance work on the gas reticulation system at BLH since 2013 and he believed that there was an area contract with BOC for the Southwest Health Area. He gave evidence that he was the designated person to contact at Bankstown Hospital in relation to this system (Transcript p193).
3. Mr Brightwell said that part of his responsibilities included ensuring that the gas reticulation system at BLH was serviced and maintained as required by the Australian Standard (Transcript p193).
4. Mr Brightwell gave evidence that he would undertake the following procedure when servicing or maintenance of the system had to take place:

* He would make contact with BOC, or they would make contact with him as the designated person for them to contact;

* He would find out the scope of work that was to be performed on that particular visit, how long the visit would be, how long the work time would be, and which area of the hospital the work was to be carried out;

* He would liaise with the hospital personnel in that area and ascertain when and how the work could be carried out;

* He would make arrangements with the hospital staff and the contractors; and

* When the work was finished he would be responsible for checking that it had been done in accordance with the requirements, including the requirements of the standard, and ensuring the handover process took place so that the hospital could then use the system (Transcript p193-194).

The Work

1. Mr Brightwell gave evidence that on the evening of 14 July 2015, he met with 'Chris Turner and another Chris and an apprentice' at BLH, who he introduced to the theatre manager, Eleanor (Transcript p174). Mr Brightwell gave evidence that he could not recall whether there was any discussion about which theatres were to be worked on nor what order in which the jobs were to be done (Transcript p174-175). Mr Brightwell could not recall which night it was that OT8 was to be worked on, though he said that he considered the order specified in Eleanor Halvey's email (Exhibit C, Transcript p24) was the correct order (Transcript p176).

2. Mr Brightwell said that during the course of the initial meeting, he instructed that all cut-ins of the pipework had to be after the valve box so that if the gases needed to be turned off in the theatre, all gases would be able to be turned off from the valve box (Transcript p178).
3. Mr Brightwell said that there was no form of induction to the worksite for the workers apart from showing the workers around the hospital and the location of security, the theatres and the change rooms (Transcript p178).
4. Mr Brightwell recalled that none of the workers were present on the morning after the first shift (15 July 2015) and at this stage, no handover of the facilities had occurred so the wall panels were not yet able to be used (Transcript p179, 200). Mr Brightwell was present when Mr Turner, Mr Heasman and Mr Simpson returned to work on the second shift.
5. On the morning after the second shift (16 July 2015) at about 7:00am, he met with Mr Turner who was still present (Transcript p179). Mr Brightwell gave evidence that he and Mr Turner had a conversation and Mr Turner asked Mr Brightwell to sign the testing certificates (Exhibits D and E) (Transcript p179).
6. To the best of his recollection, Mr Brightwell said the conversation went as follows:

'These need to be signed?'

I asked, 'Don't we have to go up and test?'

His response was 'The testing had already been completed' (Transcript p179).

1. Mr Brightwell said that the forms had already been filled out by Mr Turner and signed. Mr Brightwell also said that Mr Turner told him that 'the other Chris had witnessed the testing'. Mr Brightwell said that he had no reason to doubt what Mr Turner had told him and subsequent to this conversation, he signed the paperwork (Transcript p179, 235). Mr Brightwell said that he was authorised in this circumstance to acknowledge the completion of the work (Transcript p225).
2. However, Mr Brightwell later conceded that when Mr Turner said that the tests had been done, Mr Brightwell didn't actually understand which tests had been done but took Mr Turner's word that the testing had been done (Transcript p216).
3. Mr Brightwell said that when signing the forms, he was not aware that the date on the forms was incorrect (Transcript p181). Mr Brightwell said that aside from signing the documents, he didn't read them (Transcript page 181). When asked why he signed the documents, Mr Brightwell said 'I was asked to sign them and they had a little Post-It note that said, 'Sign here' (Transcript p181).
4. Mr Brightwell said that when signing the document entitled 'Medical Gas Outlet Test Form' (Exhibit E), under the words 'witnessed by', he believed he was witnessing that the work had been completed (Transcript p181). He confirmed that he was not present during the course of any testing of the system that had been installed (Transcript p181).

5. Mr Brightwell gave evidence that when presented the testing forms by Mr Turner (Exhibits D and E), he understood that they were the forms for the work that he understood had been performed, though did not look at the heading of any of the forms that he was signing and did not see the references to the clause of the Australian Standard (Transcript p209-211).
6. He did not read any of the figures, including the figures for oxygen purity (Transcript p226).
7. He did not see the words 'These test procedures have been carried out in accordance with the requirements of Australian Standard AS2896. All zone isolation valves function as specified' on T1, or the words 'These test procedures have been carried out in accordance with the requirements of Australian Standard AS2896. All medical gas cross-connection tests are satisfactory' on T2 (Transcript p210-211).
8. Mr Brightwell said that whilst he knew that cross-connection and gas purity tests had to be done, he did not check whether they had been done by looking at the form (Transcript p215):

'Q. So you say, do you, that even though you knew that cross-connection tests had to be done and gas purity tests had to be done, you didn't actually check whether they had been done by looking at the form to see that you were signing that they had been?

A. No.

Q. When you were signing the form, how were you satisfying yourself that those tests had been done?

A. Because I took the word of Mr Chris Turner.

Q. Do you say Mr Turner told you which tests had been done?

A. No. That all the testing had been done.

Q. How did you know that included cross-connection testing?

A. I didn't know.

Q. It was important though; you knew that.

A I took the word of Mr Turner that all the testing had been done.'

1. Mr Brightwell conceded that if he didn't know what testing had been done, either from his own knowledge, because Mr Turner had advised him, or from reading it on the testing forms, he could not, in accordance with the hospital system, accept the handover of the panels, and that the panels should have been rejected until he did understand what testing had been done or had witnessed the actual testing (Transcript p216-217).

'Q Did you understand it to include any particular testing?

A The testing that needed to be done.

Q Well, did you understand what testing needed to be done?

A Not all the testing, no.

Q Did you understand any of it?

A No

Q When he said all the tests had been done, you actually didn't understand what he was saying?

A No.

Q Why didn't you inquire?

A I took his word that the testing had been done.

Q But you didn't know what that testing was.

A That's right.

Q How could you, on behalf of the hospital, accept the handover, in accordance with the system you have described, if you didn't know what testing was being done?

A I took his word that the testing had been done.

Q Mr Brightwell, if you didn't know what testing had been done- either from your own knowledge or because he'd spoken to you about it or because you read it on the form- you could not, in accordance with the hospital system, accept the handover of the panels, could you?

A No.

Q That, in accordance with the hospital's handover system, meant they should have been rejected until you did understand what testing had been done.

A Or witness the actual testing.

Q Or witness?

A That's correct.'

1. Mr Brightwell gave evidence that prior to seeing Mr Turner and being shown the testing forms (Exhibits D and E), he had never been told or advised by anybody that he would have to take part in the commissioning of the work (Transcript p182). Mr Brightwell said that none of Mr Turner, Mr Heasman or Mr Simpson, nor anyone from BOC, had asked him prior to the signing of the testing forms whether he was experienced in the administration of medical gases to patients.

2. Mr Brightwell said that if he had known before he signed the testing forms that he was required to have witnessed the testing before signing, he would not have signed them having not actually witnessed the testing (Transcript p185). However, in cross-examination, Mr Brightwell conceded that it was his expectation that he should witness the testing, because it was 'just what I thought should happen' and because it was a requirement in the Australian Standard and part of the hospital handover procedure (Transcript p205).

AMANDA LARKIN

1. Amanda Larkin ('Ms Larkin') was called and gave evidence that she was the Chief Executive of the South Western Sydney Local Health District. Ms Larkin held this position in July 2015. Ms Larkin confirmed that the maintenance and service of the gas reticulation services at BLH rests with the engineering department of BLH, and in particular Mr Brightwell in his position as the head of that department. Ms Larkin confirmed that when works are performed at BLH, a handover is required to take place, and as assistant engineer at BLH, it was Mr Brightwell's responsibility to ensure that the testing of the newly-installed outlets and panels had been undertaken in July 2015 (Transcript p230). Ms Larkin gave evidence that if Mr Brightwell had not signed the handover documents then the newly installed panels would not have been able to be used by hospital staff, and it was only the fact that he, in conjunction with Mr Turner, signed those documents, that the facility was used (Transcript p240).

STUART CLIFTON

1. Mr Stuart Clifton ('Mr Clifton') was called. Mr Clifton is a director of SC Medical Pty Limited, a biomedical engineering firm, who provided an expert report in these proceedings dated 17 August 2016 (Exhibit B, Tab 9). Mr Clifton's firm is a competitor of BOC in relation to the installation of gases in hospitals (Transcript p261).
2. Mr Clifton opined that the best procedure to follow when cutting into a gas line (say, oxygen) in accordance with the Australian Standard ASNZ2896 is to:

- * Isolate the oxygen line to that area;
- * Go to an existing outlet in that area which is labelled 'oxygen' and proceed to empty the line by opening that outlet;
- * Return to the valve box and confirm the gauge there was reading 'zero' for oxygen;
- * Locate the oxygen line in the ceiling and proceed to make a small effective incision in the pipe and verify that it was empty (noting that if it started to expel a gas, then the worker would know that they had cut into the wrong line);
- * Once the worker had detected no gas, continue to cut into the line;

* 'Cut in the new T and then bring in the new branch line so they're a new outlet – or new pipework';

* Pressurise the line by going back to the valve box and turn the oxygen valve on; and

* Return to the original outlet (used to depressurise the line) labelled 'oxygen' and verify the oxygen is now re-established (Transcript p253-254).

1. Mr Clifton said that at this time it was not necessary to do a gas identification check on that line (Transcript p254).
2. Mr Clifton opines that if the hospital nominated an engineer as their representative for commissioning, he would accept that a hospital engineer would have an understanding of the gas system in the hospital for the purpose of commissioning (Transcript p260).
3. Mr Clifton gave evidence that if a worker was intending to work on three gas lines (say, oxygen, medical air and suction) and turned off all three valves at the valve box, the lines downstream of the valve box (that is, inside the theatre) would remain pressurised with gas. When specifically asked, he conceded that if a worker bled down only one gas, say oxygen, and then cut into an incorrect pipe, that being the medical air, suction or any other gas pipe, in the ceiling, the worker would experience the expiration of gas from that cut in the same way as the procedure he previously described (Transcript p261-262).
4. Although Mr Clifton opined that this was not usual practice he conceded that this practice would achieve the purpose of clause 4.13 of ASNZ2896 (Transcript p262-263). He gave further evidence that in the event that a nitrous oxide pipe had been mislabelled oxygen in the ceiling, if either only the oxygen valve or all three of the oxygen, medical air and suction valves had been turned off, the worker who cut into the mislabelled oxygen pipe would still experience the release of gas from the cut in the pipe (Transcript p265).
5. Mr Clifton confirmed that in the case of the works at BLH in July 2015, there was no need to turn off the nitrous oxide valve (Transcript p265).
6. Mr Clifton gave the following evidence in cross examination (Transcript p268):

'Q. There are two primary tests that are required by the Standard that if carried out make it impossible for the system not to operate safely, aren't they?

A. That's correct.

Q. The first is the cross-connection test?

A. Yes.

Q. And the second is the gas purity test?

A. That's correct. Well, its purity, identity.'

1. Mr Clifton gave evidence that at Clause 5.2 of the Standard, which provides that the hospital shall designate a competent person or persons to carry out the tests set out at Clause 5.1, this can be achieved by a healthcare facility appointing a company such as BOC to carry out that function (Transcript p271). He gave evidence that in this matter, BOC gave a quote that included testing and commissioning which was standard practice and by accepting the quote, BLH effectively undertook its responsibility under Clause 5.2 to designate BOC as the competent person to do that work (Transcript p271).
2. Mr Clifton gave evidence that in relation to the tests specified at Clause 5.1, not all of those tests will be able to be, or are necessary to be performed in all circumstances of gas installation at a hospital and that a level of interpretation is necessary to work out which of the tests apply in the circumstances of the installation work at BLH in July 2015 (Transcript p271-272).
3. Mr Clifton opined that had the testing been done for cross-connection and gas identity, the error that existed in the BLH facility on 16 July 2015 would have been identified before commissioning was allowed to be completed (Transcript p279).
4. Mr Clifton confirmed that if a worker was to turn on an oxygen analyser if they looked at the digital display, it would indicate whether or not the oxygen analyser was working as it would begin to read the oxygen content of the atmosphere. Further, he gave evidence that if the worker was to hold the oxygen analyser up to an oxygen outlet in an operating theatre, and it did not read 100% as expected, it would be prudent to replace the analyser and do the test again (Transcript p283). In the event that the reading of the analyser was not 100% for an oxygen outlet for any reason (due to a faulty analyser or an issue in the new gas fitting or otherwise) the commissioning process would not be able to be completed (Transcript p283-284).
5. Mr Clifton confirmed that if the worker was to hold up an oxygen analyser to an outlet from which nitrous oxide was being emitted, the analyser would show a reading of less than 5%, and that it is not possible to get a reading in a way that nitrous oxide could be mistaken for oxygen (Transcript p284).
6. Mr Clifton opined that the results included in the testing forms (Exhibit E) for theatre 5 would indicate a failure of commissioning rather than a pass as the figures for 'pressure drop' in that form are incorrect (Transcript p295).
7. He was further asked about the gas purity test (Transcript p309) and said;

'Q. You gave some evidence about the oxygen analyser yesterday.

A. Yep.

Q. The application of the oxygen analyser to the oxygen outlet is a very simple procedure, isn't it?

A. It is.

Q. The testing for gas identity is a very simple procedure isn't it ?

A. It is.

Q. That it is also a procedure that you can perform easily and quickly?

A. It is.'

1. And further (Transcript p312):

'Q. So if you performed, in July 2015, the gas identity test on the oxygen outlet at theatre 8 at Bankstown Hospital, you could not have got 100% as being the oxygen reading, could you?

A. That is correct, you could not have.

Q. Indeed, because nitrous oxide was coming out, you were most likely going to get a reading of zero?

A. Correct.

Q. If you didn't get that, you might get 1% or 2%, but certainly not any significant percentage?

A. Yeah, yeah. Basically, you'd get, yeah, less than 10% generally, but yeah. Yeah.

Q. So if you performed the gas identity test and you did no other testing at all on the facility as it existed in July 2015 in theatre 8 at Bankstown Hospital, you would have identified conclusively that there was a problem, wouldn't you?

A. Agreed.

Q. And you could not be mistaken about that, could you?

A. No, not at all.

Q. So that's why, is it, that you've referred to it as the ultimate test?

A. Correct. That's the only one that matters.'

CHRISTOPHER TURNER

1. Mr Turner was not called to give evidence. On several occasions the prosecutor sought an adjournment so that Mr Turner could be called to give evidence in the prosecution case, and therefore be available for cross-examination by counsel for BOC. On each occasion the adjournment was opposed by BOC, and subsequently refused by me. Thus, BOC forwent the opportunity to cross-examine Mr Turner.
2. The Section 155 Notice issued to Mr Turner on 30 June 2017, together with responses and various annexures was tendered by the prosecutor (Exhibit O).

3. In answer to questions in Exhibit O, Mr Turner described himself as a qualified journeyman plumber. He undertook a three year apprenticeship and received a craftsman's certificate issued by the then NSW Plumbing Board in 1982. He described having 26 years' experience working in the NSW health system in relation to the installation, service and repair of medical equipment at NSW hospitals.
4. He had previously worked for CIG Healthcare (then owned by BOC) and its successor companies. Whilst working for them, he performed installations and service repairs. He had previously done service and repair of medical equipment.
5. He described that between 2000 and 2015 whilst working for Addtech Medical he was the service and repair manager of anaesthetic and oxygen therapy equipment. Over those 15 years, he also did some third party commissioning and some small installations, but mostly service and repair. Whilst working for Addtech Medical, about 95% of his work was service and repair performed in hospital settings, and about 5% involved installation of gas lines to hospital facilities and third party commissioning.
6. With regard to the events in July 2015, he indicated that he could recall attending the hospital with Mr Heasman on or about 13 or 14 July when Mr Heasman spoke to the hospital engineer, Paul Brightwell and the Nurse Unit Manager ('NUM') whose name he did not recall.
7. The Section 155 Notice then records the following questions and answers:

'Q97. For the operating theatres in which you worked please describe in detail what procedure you followed for connecting new pipework (to establish new neo-natal resuscitation panels consisting of oxygen, medical air and suction outlets) to the existing pipework system?

A97. My practice with respect to installing the new gas lines involved first turning off the line I intend to work on from the valve box and leaving the lines for the other gases untouched. Although I do not have a specific recollection of how I performed the work on 14, 15 and 16 July I have no reason to believe that I would have adopted anything other than my usual practice. This process of only turning off the gas line being worked on is in accordance with AS2896-2011 and ensures that if the wrong line is cut I can hear the gas hissing.

Once I isolated the gas line to be worked on (oxygen, air or suction), I then cut into the line between the valve box and the relevant theatre and installed further copper piping between that line and the metal plate outlet in the operating theatre for the neo-natal resuscitaries. If for any reason, I cut into the incorrect gas line, that would result in an audible hissing noise because I only ever shut off the lines of the gases I am working on. I did not hear any hissing noises from the lines that I worked on.

...

Q101. Why was this method selected?

A101. It is best practice and consistent with AS2896-2011.

...

Q106. Did you verify any of the installation work undertaken by your co-workers in the operating theatres of Bankstown-Lidcombe Hospital?

A106. I did not verify the installation work, however when the work in all the theatres had been completed I undertook flow testing and pressure testing of all of the newly installed neo-natal resuscitation panels in each of the 8 theatres.

...

Q111. Outline in detail all testing undertaken by you during and after the installation process of the neo-natal resuscitation panels in the operating theatres you worked on?

A111. I refer to my answer to question 93. Further, once the installation of all eight theatres had been completed in the early hours of 16 July 2015, I undertook testing of all the newly installed outlets whilst Mr Heasman and Mr Simpson tidied up.

I commenced with the tests for cross-connection, pressure and zone isolation valve tests. Zone isolation valve testing is a pressure test of the valves for closure and leakage that is performed with a test gauge on the valves at the valve box. The method I used was to pressurise the systems, close one valve, bleed that system to lower the pressure, then check the gauge on the valve to verify there was no pressure rise indicated, I then repressurised the line, closed the valve again and waited a few minutes to verify that there was no pressure drop indicated on the gauge on the isolation valve.

After this, I undertook the tests for cross-connection. The process I used for each cross-connection test was to shut down the air and suction. This blew the air and suction of those lines. I then confirmed that the gas in the oxygen line was still pressurised. I then turned the air on and confirmed the pipeline was charged and that no suction was present. I then turned the suction on. This process confirms that there is no cross-connection in the lines between the oxygen, air and suction lines. I went from theatre to theatre undertaking the zone isolation valve test and cross-connection tests.

After this, I undertook the tests at the terminal units (that is, where the oxygen, air and suction outlets on the neo natal resuscitaires were placed). These are the tests for system leakage, the test for flow and pressure drop at the terminal unit and the test for performance of the pipeline system. This testing was performed using a pressure gauge and, for the suction, I used a gap metre, which is a device used to test negative pressure. I performed these tests in each of the theatres and wrote down my readings on the Medical Gas Outlet Test Form.

The next test I performed was for gas purity. I tested the oxygen levels in the oxygen line and the air line. These tests were performed at the newly installed gas terminals in each of the 8 theatres. I used a hand held device known as an oxygen analyser that was supplied by BOC. I recorded the results of my testing on the Medical Gas Outlet Test Form.

Chris Heasman and Bailey Simpson were aware that I was doing the testing and were frequently in my presence whilst I did the testing. Although I do not now specifically recall the detail of any conversation I believe that I would have indicated to them from time to time that everything was good with the testing and that no faults had been found.

Q112. Did you undertake any testing in relation to the work undertaken in operating theatre 8?

A112. Yes.

...

Q114. At what points during the installation process for operating theatre 8 was testing undertaken?

A114. If I did the cut in work at theatre 8 (noting that I do not now recall whether or not I did do that work on theatre 8) then I would have conducted cross-connection testing for that theatre once I completed cut-in, charging the pipeline and checking for leaks. I can recall doing this testing with Bailey in at least one theatre, but I don't know which theatre it was. In addition, the testing that I describe in question 111 I did for all of the theatres after all of the installation work was completed.

...

Q121. How did you assure itself that any testing undertaken was in accordance with the requirements of AS2896-2011?

A121. The testing described at question 111 was undertaken to ensure that all of the lines that had been installed were working correctly.

Q122. Did you undertake any inert gas flushing?

A122. No

...

Q124. Did you undertake any testing to ensure there was no contamination of the newly connected neo-natal resuscitation panels?

A124. Yes.

Q125. If yes, how did you test this?

A125. See my response at question 111 in relation to cross contamination tests.

Q126. On previous occasions had you undertaken similar work (installation and testing) to that which was undertaken at Bankstown-Lidcombe Hospital?

A126. Yes.

Q127. If yes on how many occasions had you participated in a similar work?

A127. Between 1990 and 2015, I had performed installation and testing work on approximately 3 or 4 occasions.

Q128. Was there anything significantly different about the work undertaken at Bankstown-Lidcombe Hospital?

A128. Yes.

Q129. If yes what was different?

A129. Unlike all previous installations in which I was involved, this was the first time:

- a) that the work was done only at night;
- b) that I was under supervision;
- c) that I was working with others;
- d) that I was working with an apprentice;
- e) that Australian Standard testing did not occur.

...

Q131. How was it decided who would complete this documentation?

A131. Sometime around the time we were completing the first night's work I had a conversation with Chris Heasman to the following effect:

CH: We will have to organise the commissioning of the lines.

Me: Do you have the books?

CH: No, they're at the workshop. I can't get them, you'll have to do it.

Me: Where are they?

CH: They're in workshop somewhere, you'll have to find them. Anyway I can't do it tomorrow morning, I have other work. Check with Paul Brightwell and organise it with him. (I understood the reference to commissioning to be a reference to the requirement in the Australian Standard for testing to take place in the presence of an engineer and the NUM).

Me: OK.

Sometime on 15 July I went to the workshop and collected the books containing the Forms. The Forms were in triplicate, with one copy for BOC, one for the customer, and one copy remaining in the book. When I attended at the hospital to continue the work on 15 July I saw Paul Brightwell and said words to the effect of:

Me: We're half way through the work, we expect to finish tonight. When can I meet you to commission the work – I can come in tomorrow morning before the theatres start, you need to organise the theatre NUM to be there too.

PB: I'll come in early tomorrow so that it can be done before theatre starts. I'll try to be there by 6:30am, meet me then.

I do not now recall whether Chris Heasman was present when I had that conversation, but I think he probably was. If he wasn't present, I later told Chris that I had made the arrangements with Pau Brightwell to commission the work.

After the installation in all of the theatres was completed in the early hours of 16 July, I went down to my car and collected the testing equipment and the Forms books. I used the Medical Gas Outlet Test Form to record the outcomes of each test, as set out at paragraph 111. When I had finished the testing I took the time to fill in the testing forms to save time in the morning, when I was to meet up with Paul Brightwell to commission the work. I was aware that the theatres would be required for patients on 16 July, and thought that if the paperwork was already filled out it would save some time in the morning. When I filled in the Test Forms on 16 July I expected:

- (i) to repeat the testing in the presence of Paul Brightwell and the NUM when I returned around 6:30am; and
- (ii) that the results of the testing would be identical to the tests I had just conducted.

Q132. On each of the 7 pages whose signatures are on this documentation?

A132. The Hospital Engineer, Paul Brightwell, and mine.

...

Q135. What information did you provide to Paul, regarding the test forms T1, T2, T5 and T6?

A135. I refer to question 131 and say further that at approximately 6:30am on the morning of 16 July 2015, I returned to the hospital and went to Paul's office to commission the work. I brought with me the test forms I had completed a few hours earlier, and the test gauge, the gap metre and the oxygen analyser that I had used a few hours earlier.

I said to Paul words to the effect of "We are happy with the way the job went. I'm happy with the testing I've done, everything is working. Let's go up the theatres and get started."

He said words to the effect of "I'll take your word for it." Paul then signed the forms then and there in his office.

...

Q139. How did you satisfy yourself that the tests in forms T1, T2, T5 and T6 were undertaken in accordance with AS2896-2011?

A139. I refer to question 131 and say further that, even though the testing that I undertook at around 2am on 16 July was for the purpose of checking whether all of the systems worked, I adopted the same process in undertaking the testing as I would if I had been undertaking the testing with Paul Brightwell and the NUM.

...

Q143. If no, why did you not undertake the testing and commissioning of the new pipework for the neo-natal resuscitation panels (consisting of oxygen, medical air and suction outlets) in the operating theatres of Bankstown-Lidcombe Hospital?

A143. I attended at the hospital at 6:30am prepared to undertake testing of the installation and Paul Brightwell elected not to proceed with that testing.

...

Q152. I refer you to the Medical Gas Outlet Test Form (pages 1 of 2 and 2 of 2). Did you undertake the tests outlined in that form?

A152. Yes.

Q153. I refer you to the Medical Gas outlet Test Form (pages 1 of 2 and 2 of 2). For theatre 8 there are 2 outlet types recorded as "oxy". Why are there 2 measurements for oxygen concentration?

A153. When an outlet is being used for oxygen or aid, it may be used on a patient with a ventilator. Accordingly two pressure tests are required, one at 40 litres per minutes pressure, and one at 250 litres per minute pressure.

Q154. I refer you to the Medical Gas Outlet Test Form (pages 1 of 2 and 2 of 2). Were the 2 measurements taken of the same oxygen outlet at the neo-natal resuscitation panel of theatre 8?

A154. Yes.

...

Q157. What equipment did you use to test pressure at the outlets of the newly installed neo-natal resuscitation panels?

A157. I used a pressure test gauge to test the pressure.

Q158. Who owned the equipment that was used to test pressure at the outlets of the newly installed neo-natal resuscitation panels?

A158. I did.

Q159. What equipment did you use to test the type of medical gas being emitted at the outlets of the newly installed neo-natal resuscitation panels?

A159. Oxygen Analyser.'

BOC LIMITED

1. A Section 155 Notice was also issued to BOC and responses were made by Robin Bell who was the head of Health, Safety and Environment ('HSE'), Region South Pacific ('RSP') dated 22 March 2018. A redacted version was part of the prosecutors tender bundle behind tab 4 (Exhibit B).
2. The answers to the questions posed in the notice provide background information as to the operations of BOC, and the main components of their business. As at July 2015, BOC employed about 1792 people and by February 2018 they employed about 1362 people. Mr Bell was the head of HSE at the defendant, and remained so as at March 2018.
3. The following questions and answers are relevant to the defendant's conduct after the incidents:

'136. Has BOC Limited made any changes to systems of work concerning the installation and commissioning of medical gas pipeline systems?

BOC Limited continually reviews its systems and processes. Whilst BOC is of the view that its procedures in place as at 14 July 2015 were appropriate and complied with the requirements of AS 2896-2011, following the identification of the fault in the installation at the Bankstown-Lidcombe Hospital on 21 July 2016, BOC introduced additional measures to its own systems, beyond the requirements of AS 2896. These measures included:

- (a) BOC revised its Medical Gas Pipeline, Vacuum and Scavenging System Commissioning Procedure such that:
 - (i) For every medical gas installation, a BOC appointed representative who is not part of the physical installation team, must carry out the final commissioning test and check of the system before it is handed over to the healthcare facility for use;
 - (ii) The person who physically installs the pipework must not commission and sign off their own work, but should attend; and
 - (iii) The BOC appointed commissioning officer must be certified and licensed for medical gas system commissioning by BOC management. BOC also introduced Competency Based Training and invested in training facilities to confirm competence;
- (b) BOC revised its installation procedures for Medical Gas Pipeline, Vacuum and Scavenging System Installation Procedure and updated its training to reflect the revisions.

- (c) Put in place increased project management requirements for all BOC medical installation projects.
- (d) Reinforced that the healthcare facility representative must be competent in medical gas testing and verification of piping systems; and
- (e) Specifying requirements for the issuing and tracking of analysers and medical kits;
- (f) Refreshing BOC's test certificate forms to exceed AS 2896:2011 requirements;
- (g) Requiring specific pre-commissioning checks to be undertaken;
- (h) BOC now maintains a list of those certified and licensed BOC medical gas commissioning personnel and linked to this list is the person's Traccess profiles (i.e. the record that they have completed the required training and that the training is current).
- (i) CES drafted a specific policy on the management of fatigue and this was published and added to the CES training profile.

BOC has communicated these changes to procedure to employees and contractors by issuing E circulars on medical gas pipeline commissioning and connection to existing systems and by refreshing internal training programs to reflect these changes to procedure.

BOC is a contributing member to, and sits on the Board of the Australia New Zealand Industry Gases Association (ANZIGA), has representation on the relevant Standards Australia Committee and internally maintains a team of experts who are available to review various activities, including standards. In that role, BOC initiated discussions with Standards Australia with a view to seeking a review of AS 2896-2011.

BOC also made a submission to Standards Australia which set out BOC's recommendations for industry wide improvements/clarifications to the Standards. Specifically, BOC suggested that the Standard be amended so that the process around cross connection testing was clear and took into account the risk of an installer being inadvertently exposed to a pressurised pipeline when checking for cross connection and how to eliminate or mitigate this risk.

Q144. How does BOC Limited think this incident could have been prevented?

A144. BOC is not capable of having an opinion and as such is unable to answer the question. The fault found at the medical oxygen outlet in theatre 8 on 21 July 2016 does not reconcile with the commissioning documentation of July 2015.'

CONSIDERATION

ELEMENT 1 – Whether the defendant was conducting a business or undertaking

1. It was not a contest that the defendant was a person conducting a business or undertaking, which owed a health and safety duty under s 19(2) of the Act to the babies.

ELEMENT 2 – Whether the defendant owed a health and safety duty to ensure so far as is reasonably practicable the health and safety of persons is not put at risk from work carried out as part of the business or undertaking

1. I am satisfied beyond reasonable doubt that the defendant owed a duty to not put at risk the safety of persons, and in particular the babies.

ELEMENT 3 – Whether the defendant failed to comply with its health and safety duty

1. The summons particularised the alleged failures as follows:
 - (a) Conducting (or arranging for a suitably qualified person to conduct) a risk assessment prior to undertaking the work which identified the hazards and risks associated with the work. In particular, a risk assessment would have:
 - (i) Identified the risks associated with undertaking the work, including the risk of cross connection of the pipes;
 - (ii) Assessed the identified risks;
 - (iii) Identified the most appropriate work methods for undertaking the work; and
 - (iv) Identified the most appropriate control measures for undertaking the work.'
1. I accept that there had been a risk assessment performed by the defendant, as this was precisely the kind of work that they did and contracted to have done over many years. The industry that the defendant operated in, and the nature of the work that was done, suggests to me that they had a system of work that identified the risks to safety within its operations or arising from the work performed and measures to eliminate those risks. The testing forms (Exhibit D) make provision for testing for cross-contamination and provides the methods by which this is to be done.
2. The methodology for the testing required is explained on the forms themselves. The parts of the Standard that is applicable is also referenced on the forms.
3. The drafting and preparation of the forms (Exhibit D and E) can only have come after the defendant had in fact conducted a risk assessment, as the forms implicitly highlight where risks may arise, and so as to eliminate those risks, specific steps as part of a testing and checking regime are mandated in the forms.
4. The risk of cross-contamination is specifically included in Part 2 of Test Certificate – Form T1. It provides the methodology and references the Standard. Clearly the inclusion of that paragraph at least demonstrates that a risk assessment has been done and provides for control measures described therein.

- (b) Developing and implementing a Safe Work Method Statement ('SWMS') or having a safe work procedure for the work which complied with Australian Standard AS 2896-2011 Medical Gas Systems – installation and testing of non-flammable medical gas pipeline systems ('the Standard') and which required:
 - i) Connection of the port to the existing pipework to be undertaken in only one gas system at a time to minimise the risk of cross-connection; and/or
 - (ii) Testing by a designated person to determine that the concentration of oxygen was correct and that there was no contamination; and/or
 - (iii) The testing referred to in subparagraph (ii) above to be conducted; or
 - (iv) In the presence of a member of BLH experienced in the administration of medical gases to patients; or
 - (v) By the anaesthetist in charge or a delegated anaesthetist.
- 1. The BOC test forms (Exhibits D and E) in my view can be viewed as a SWMS which conformed with the Standard. Each of the tests that are specified in the test forms were directed at identifying and eliminating risks arising from the installation of medical gases. Relevantly, the cross-connection test and the gas identity test were directed at eliminating the risk of cross-contamination.
- 2. Test Certificate – Form T1 provides in Part 1 the Test for Zoning. The test method on the form is as follows:

'One system at a time was pressurised using above pressures. Ensure only designated zones (terminal units) are controlled. Check correct Gas ID labelling and areas controlled are correctly nominated.'

- 1. It continues on the next line in bold type as follows:

'These test procedures have been carried out in accordance with the requirements of Australian Standard AS2896.'

- 1. The forms T1, T2 and T5 all contain lines underneath which is written 'installer', 'contractor's officer' and 'clients officer'. The testing is required by the forms to be done by the installer. In the present case this could be either Mr Heasman or Mr Turner. There is no evidence as to why the forms were completed by Mr Turner. It is to be remembered that he is contracted through his company Pro-Med to the defendant. Mr Heasman was a direct employee of the defendant.
- 2. The two remaining lines for signatures are for the contractor's officer and client's officer as witnesses to the testing. The person who signed as having witnessed is Mr Brightwell, despite not having observed any testing at all.

3. Mr Brightwell was put forward by BLH as the relevant person to witness the testing. He was neither an engineer nor a doctor nor someone experienced in the administration of medical gases of patients, yet the hospital proffered him the person to be the witness for the purposes of testing and commissioning the works.
 4. Unfortunately, it matters not that Mr Brightwell was not appropriately qualified, as he signed the forms regardless, having not witnessed any of the testing.
 5. I accept, based on the evidence of Mr Clifton, that the Standard does not require the testing be witnessed by an anaesthetist or a delegated anaesthetist. However, it does seem to me that the utilisation of either anaesthetists or nurses experienced in the administration of medical gases to patients would be the far more prudent approach.
 6. Having accepted that Exhibits D and E constitute a SWMS, and that if the work had been done with the necessity for the forms to be completed after the work was finished in mind, the incidents would not have occurred.
- (c) Ensuring that any contractors engaged by BOC to conduct the work are provided with the SWMS or safe work procedure set out in (b) above or ensuring that the contractor has its own SWMS or safe work procedure which complies with the Standard in the manner set out at (b) above.
1. Having accepted that Exhibits D and E constitute a SWMS, they must have been made available to Mr Turner, as he had them in his vehicle having collected them from the defendant's workshop.
 2. The testing certificates make it clear that there were tests that were required to be undertaken, and reflect a methodology to eliminate known and identified risks arising from the installation of medical gas systems.
 3. Each of the test certificates specified the clause of the Standard that was applicable to the test in bold and the requirement for the installer and the witness to sign.
 4. For example, Test Certificate – Form T1 at Part 2 refers to the tests for cross-connection, includes a reference to Clause 5.4.6 and its requirements having been met, and states, 'These test procedures have been carried out in accordance with the requirements of Australian Standard AS 2896. All Medical Gas Cross Connection Tests are satisfactory.' Test Certificate – Form T5 at Part 12 refers to the tests for gas purity, includes a reference to Clause 5.6.5 and its requirements having been met, and states, 'These test procedures have been carried out in accordance with the requirements of Australian Standard AS 2896. All Medical Gas Purity and Identification Tests are satisfactory.'
 5. By providing these forms to Mr Turner, I accept that the defendant has, as is reasonably practicable, complied with particular (c).

- (d) Providing instruction, information and training to workers, in particular Mr Heasman and Mr Turner in the SWMS or safe work procedure.
1. The answers given by Mr Turner in his s 155 Notice to my mind establishes that he knew what the job involved, was competent to do so, and was aware of, and knew the requirements of the Standard. He describes the Standard and the tests contained therein in a way that demonstrates that he knew the tests were directed at identifying and eliminating the risks arising from the installation of medical gases, and knew the methodology for the identification and elimination of those risks. Similarly, the evidence of Mr Heasman also demonstrates that he knew what was required of him in doing the work, had the skills and knowledge to do so, and was aware of the testing requirements.
- (e) Instructing workers, in particular Mr Heasman and Mr Turner, that testing should be undertaken at the completion of the work and, in particular, that the testing should:
- Determine the identity of the gas being emitted from the new ports was correct by performing a cross-connection test;
- Determine the concentration of oxygen being emitted from the new ports was correct and that there was no contamination; and
- Be conducted in the presence of a member of BLH experience in the administration of medical gases, or
- Be conducted by the anaesthetist in charge or a delegated anaesthetist.
1. The operational tests were required to be performed in the presence of a member of the health care facility experienced in administration of medical gases to patients in accordance with Clause 5.7.1 of the Standard.
 2. Mr Turner gave a description of his testing procedure at A111 in Exhibit O. In that response it is clear that he had done the work before and knew what he was required to do. He was clearly aware of the requirements to satisfy the Standard. It is impossible to conclude that he complied with the terms of the Standard, as had he done so, the incidents would not have occurred.
 3. The evidence indicates that the testing of the oxygen outlet in OT8 may not have been completed by Mr Turner at all. It is impossible that if the testing regime had been properly performed, the cross-connection would not have been detected. The BOC forms detailed the Tests for Cross Contamination and Tests for Zone Isolation Valves. The forms detail that the testing is in accordance with the Standard.
 4. The testing forms were completed by Mr Turner. The Medical Gas Outlet Test Form (Exhibit E) was completed by Mr Turner. Whilst there are some errors with regard to the entries on the form for the pressure and flow rates in OT5, I accept that these are simply mistakes in the transposition of the figures.

5. However, the entries on the form for OT8 cannot be correct. The entries were made by Mr Turner, and were signed as witnessed by Mr Brightwell. As was ultimately revealed, the oxygen outlet in OT8 was connected to nitrous oxide. If Mr Turner had done the tests as required by the forms that he signed, this error would have been picked up. I accept that Mr Turner knew that he had to perform each of the necessary operational tests prescribed in the Test Certificates. I accept that he knew that the testing had to be witnessed by a person as designated in the Standard as someone 'competent in medical gas testing and verification of piping systems'.
6. Test Certificate – Form 15. This is the handover instruction which makes reference to the Standard. Mr Brightwell signed that handover document as having witnessed that Test for Gas Purity. The document refers to the Standard and provides the methodology as to how the tests are to be conducted. This document is of great significance as the facility cannot be utilised by the hospital until the handover is complete. In so signing, it is incumbent upon Mr Brightwell to check and witness that all of the works have been done properly. Ms Larkin (Transcript p239 and 240) indicates that the direct responsibility for ensuring that the system for piping medical gases, including oxygen, was serviced, maintained and kept up to standard was held by Mr Brightwell.
7. Her evidence (Transcript p240) was:

'Q If Mr Brightwell had not signed the handover documents, then the facility, the newly installed panels, would not have been able to be used by hospital staff?

A Correct

Q It was only the fact that he, in conjunction with Mr Turner, signed the relevant documents that allowed hospital staff access to and use of those facilities?

A Correct.'

1. It was therefore his responsibility to ensure that the area in which the works had been done underwent the appropriate commissioning and handover, before the theatres could be utilised again.
2. It is inconceivable to me that both Mr Turner and Mr Brightwell did not understand the necessity to do the testing, and the potential consequences if the testing was not done, or was not done adequately. Whilst there is no evidence before me that Mr Turner did not do the required testing, or that he did not do it competently, on all the evidence I accept that nonetheless he falsified the testing documents.
3. There is a dispute in the evidence as to the circumstances under which Mr Brightwell signed the documents as having witnessed the testing. His evidence before me was that Mr Turner told him the testing had been done, and did not ask him to witness the testing but simply to sign the forms as he, Mr Turner, had actually done the testing.

4. Mr Turner's s 155 Notice contains an answer that when he has asked Mr Brightwell to come and witness the testing, Mr Brightwell replied as follows:

'I'll take your word for it'.

1. I am of the view that Mr Turner has entered a guilty plea to a charge brought by SafeWork NSW with regard to these incidents.
 2. I believe that Mr Turner had completed the paper work without performing the testing and thus falsified the records. I also believe that whatever was said or not said to Mr Brightwell about witnessing the testing, he signed the testing forms as having in fact witnessed the testing, but he clearly did not and has conceded such before me in court. Necessarily then, he was also complicit in signing documents that did not reflect that he had not witnessed any of the testing. The combination of the falsification of the documents by Mr Turner and Mr Brightwell had the most disastrous and tragic consequences.
- (f) Instructing workers, in particular Mr Heasman and Mr Turner, that the testing referred to in (e) above should not be undertaken in the absence of a member of BLH experienced in the administration of medical gases or an anaesthetist.
- (g) Requesting BLH to provide one of its members experienced in the administration of medical gases to patients is to be present and to witness the testing and certification of the port referred to in paragraph (e)(ii) above.
- (h) In the alternative to (f) above, requesting BLH to provide the anaesthetist in charge or a delegated anaesthetist to perform the testing referred to in paragraph (b)(iii) above.
1. With regard to particulars (f) (g) and (h) above I note that the requirement is for a person competent in medical gas testing and verification of piping systems to witness the final testing before the works can be 'commissioned' and returned to the hospital.
 2. The prosecution submits that Mr Brightwell was not competent in medical gas testing and verification of piping systems as at 16 July 2015 as he had never been involved in the administration of medical gases to patients, was not trained in testing a medical gas system in a hospital, as he was a trade qualified fitter and machinist, and held no engineering or medical qualifications (Transcript p169-170).
 3. Mr Turner's understanding seems to have been that Mr Brightwell was the hospital engineer when he spoke to him on 13 or 14 July 2015 (Exhibit O Answer 59).
 4. The prosecutor on this point makes the following submissions:
 1. Mr Brightwell did not have engineering qualifications and could not be described as being "an engineer"(as required by the Standard) in spite of his then job title.

2. Mr Clifton stated that "it's duly accepted in the industry, the hospital engineer would have an understanding of the gas system in the hospital" (Transcript p260). This, they submit, is not the test in the Standard, which required that the hospital representative not just have an "understanding" of the gas system in the hospital but be "competent in medical gas testing and verification of piping systems".
3. In any event, the prosecution submits, if there was an industry standard practice of accepting someone like Mr Brightwell as being a proper person to witness the testing of a newly installed medical gas system, such practice was clearly not in compliance with the Standard which requires that the person be experienced in the administration of medical gases. Mr Brightwell was not so experienced.
1. The difficulty that arises is that Mr Brightwell knew that he had to witness the testing, and Mr Turner understood that as the hospital engineer, Mr Brightwell was the appropriate (and nominated) person to witness the testing.
2. The prosecution submitted that Mr Turner should have enquired of Mr Brightwell whether he had the correct qualification to witness the testing, and upon ascertaining that he did not, Mr Turner should have asked BLH for someone appropriately experienced or qualified to be present.
3. The difficulty that I have with that submission is that BLH had given Mr Brightwell the job description of head of BLH's engineering department, despite the fact that he was employed as an assistant engineer, and in fact held no engineering qualifications what so ever.
4. Mr Clifton's evidence was that the appointment of an engineer as the person to witness the tests is 'duly accepted in the industry, the hospital engineer would have an understanding of the gas systems in the hospital' (Transcript p260).
5. The appointment by BLH of Mr Brightwell as the appropriate person under the Standard to witness the testing, which was confirmed by Ms Larkin, who said that Brightwell was responsible to "verify the necessary testing of the newly-installed outlets and panels had been undertaken (Transcript p240) in and of its self does not seem appropriate, nor to my mind compliant with the Standard. Implicitly BLH relied on Mr Brightwell to discharge that responsibility.
6. In those circumstances, it is not hard to see that Mr Turner thought that Mr Brightwell was the appropriate person to witness the testing.
7. Tragically, in any event, it did not matter, as Mr Brightwell signed off as having witnessed the testing when he had not done so.
8. At this point, I wish to comment on the procedure of witnessing the testing, and the commissioning of the work performed. I find it of great concern that the witnessing of testing of medical gasses that are piped into operating theatres in hospitals was allowed to be performed by someone with no medical or engineering training or qualification. It is

hard to imagine a more crucial set of circumstances where the testing must be vigorous and independently witnessed. Although not explicitly defined in the Standard, caution would suggest that the final testing and commissioning be witnessed by a theatre nurse or anaesthetist, as persons experienced in the administration of medical gasses. That could not be difficult to organise, given that the work is done in the area where appropriately qualified medical staff would necessarily be present at most times. I would think that for safety reasons with regard to works done in areas where people are undergoing medical and surgical procedures and medical gases are being administered, the hospital ought appoint a more appropriate person to witness that the testing had been performed correctly and in accordance with the Standard.

9. The prosecution submits that the failures of the defendant are two steps. The first being with regard to the cutting-in process, the second being the testing and commissioning prior to handover.
10. The defendant submits that is not correct, that it is simply the failure of the testing procedure that is a one step program, because that procedure is fool proof.
11. The defendant's case is that it matters not how the cutting-in process was done, because if the testing procedures as detailed in the testing forms had been followed correctly, the mistake would have been evident and risk could have been eliminated.
12. If the testing had been done by Mr Turner, and such testing had been witnessed by Mr Brightwell, the error would have been revealed.
13. I accept, however, whilst the testing process was in effect fool proof, it cannot be so when persons involved in the process engage in falsehoods.
14. Whether or not Mr Turner did the testing at all or inappropriately, he lied to Mr Brightwell, to the defendant and to BLH that the testing had been done at all or appropriately done. The Testing Forms were in triplicate – one for the installer (here Mr Turner), one for the company contracted to do the works (here the defendant) and one for the client (here BLH).
15. In signing the forms in the way he did, and then returning those forms to the defendant and BLH, he has represented to them that the work was done in accordance with the Forms, which it was not. He has therefore lied to the defendant and BLH.
16. Similarly, Mr Brightwell in signing the forms as having witnessed the testing, which he admits that he did not, he has lied to the defendant and his employer, BLH.
17. The handover process that had to occur before the theatres could be used, was corrupted by these lies. The introduced panels in the theatres could not be utilised until the appropriate commissioning testing had been done. It is only then that the works can be handed back to BLH, and the use of the theatres recommenced.

18. The babies were put at risk at the point in time the commissioning and handover was completed. They were put at risk because of the lies by Mr Turner and Mr Brightwell.
19. I do not accept that it was foreseeable for the defendant to anticipate that two workers performing duties with which they were both familiar, which they had both done before, would lie about what they in fact had done.
20. As such, the defendant cannot be held responsible for the behaviour of a disobedient worker, Mr Turner, for his conduct which I view as lying: Orr (supra) and Kirk (supra).
21. Mr Turner's conduct in signing the forms as the testing having been done, or done appropriately, was not mere inadvertence or a mistake.
22. The application of common sense to the facts as described in Royall (supra) suggests that the conduct of Mr Turner and Mr Brightwell in lying cannot be attributable to the defendant. The complaints made by the prosecution that there was no appropriate SWMS or training of the workers, seem to pale in significance in circumstances where Mr Turner and Mr Brightwell lied. One could not be confident that even if they were both given additional training and more detailed SWMS, that they would have followed the procedures contained therein.
23. I am not satisfied beyond reasonable doubt that the prosecutor has proved Element 3.

ELEMENT 4 – Whether the defendant's failure put persons at a risk of death or serious injury

1. For the reasons expressed I have not found that the defendant has breached its duty.
2. If I am wrong on that conclusion, and the particulars are established, then each of the pleaded failures would not have put the babies at risk because Mr Turner and Mr Brightwell chose to lie as to the testing having been done, or done appropriately and witnessed, when that was not the case.
3. In those circumstances, it seems unlikely that even if the particulars were established as breaches of the defendant's duties under s 19 of the Act to not put people and specifically the babies at risk, there is no certainty that the workers, here Mr Turner and Mr Brightwell, would not tell lies about the work that was and was not done.
4. I am not satisfied beyond reasonable doubt that the prosecutor has proved Element 4.

CONCLUSION

1. The Prosecution has not proved all of the elements of the offence beyond reasonable doubt.
2. I will not enter final orders until the prosecution has had an opportunity to consider an application pursuant to s 5AE of the Criminal Appeal Act 1912 (NSW).
3. I will list the matter on 01 June 2020 to determine the appropriate course.

ADDENDUM

Final Orders Made on 01 June 2020

1. I make the following final orders:
1. The prosecution has not proved all of the elements of the offence beyond reasonable doubt.
2. I find the defendant not guilty.
3. The Summons is dismissed.
4. I order the prosecution to pay the defendant's costs as agreed or assessed.
5. I return the exhibits.

Amendments

01 June 2020 - See addendum being final orders made on 01 June 2020

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Decision last updated: 01 June 2020

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