

SHERIFFDOM OF LoTHIAN AND BORDERS AT LIVINGSTON

[2021] FAI 16

LIV-B388-19

DETERMINATION

BY

SHERIFF PETER G L HAMMOND, Advocate

UNDER THE INQUIRIES INTO FATAL ACCIDENTS AND SUDDEN DEATHS ETC
(SCOTLAND) ACT 2016

into the death of

MATTHEW PRICE

Livingston, 5 February 2021

Determination

The sheriff, having considered the information presented at the inquiry, determines in terms of the Inquiries into Fatal Accidents and Sudden Deaths etc. (Scotland) Act 2016, (hereinafter referred to as “the 2016 Act”):

In terms of section 26(2)(a) of the 2016 Act (when and where the death occurred)

The late Matthew Price, born 3 August 1954, died at about 11.12 hours on 31 January 2018 within the rear of an ambulance outside the BP Garage, Deer Park Drive, Livingston, West Lothian.

In terms of section 26(2)(b) of the 2016 Act (when and where any accident resulting in the death occurred)

The accident resulting in the death took place between approximately 09.20 and 09.45 hours on 31 January 2018 at Final Settlement Tank No. 2 (west) at Whitburn Waste Water Treatment Works, Whitburn.

In terms of section 26(2)(c) of the 2016 Act (the cause or causes of the death)

The cause of the death of said Matthew Price was: 1(a) Chest trauma associated with probable mechanical asphyxia; and 1(b) Compression of the chest between the railings of a settlement water tank and a rotating bridge.

In terms of section 26(2)(d) of the 2016 Act (the cause or causes of any accident resulting in the death)

The cause of the accident resulting in the death was that Matthew Price had leaned through the perimeter fence around the Final Settlement Tank to carry out maintenance work, without ensuring that the bridge was isolated. He attempted to effect a temporary repair to continue the operation of the rotating bridge by re-attaching the displaced tyre of the drive wheel. While attempting to hammer the tyre back onto the wheel, he became accidentally trapped between the stanchion of the fence and the rotating bridge thereby leading to the compression of his chest and subsequent death.

In terms of section 26(2)(e) of the 2016 Act (any precautions which (i) could reasonably have been taken and (ii) had they been taken, might realistically have resulted in death, or any accident resulting in death, being avoided)

There are no precautions which could reasonably have been taken that might realistically have resulted in the death, or accident resulting in the death, being avoided; other than for Mr Price to have followed the established safe system of work by implementing the isolation procedure before placing himself in proximity to the rotating bridge at the tank.

In terms of section 26(2)(f) of the 2016 Act (any defects in any system of working which contributed to the death or the accident resulting in death)

There were no defects in any system of working which contributed to the death or the accident resulting in death.

In terms of section 26(2)(g) (any other facts which are relevant to the circumstances of the death)

There are no other facts relevant to the circumstances of the death of said Matthew Price.

Recommendations

In terms of sections 26(1)(b) of the 2016 Act (recommendations (if any) as to (a) the taking of reasonable precautions, (b) the making of improvements to any system of

working, (c) the introduction of a system of working, (d) the taking of any other steps, which might realistically prevent other deaths in similar circumstances)

There are no recommendations made.

NOTE

The Legal Framework

[1] This inquiry was held in terms of section 1 of the 2016 Act and was governed by the Act of Sederunt (Fatal Accident Inquiry Rules) 2017 (hereinafter referred to as “the 2017 Rules”). This was a mandatory inquiry in terms of section 2 of the 2016 Act as Mr Price died as a result of an accident in the course of his employment or occupation.

[2] The purpose of the inquiry is set out in section 3 of the 2016 Act as being to establish the circumstances of the death and to consider what steps, if any, might be taken to prevent other deaths in similar circumstances. It is not intended to establish liability, either criminal or civil. The inquiry is an exercise in fact finding, not fault finding. The inquiry is an inquisitorial process. The Procurator Fiscal represents the public interest on behalf of the Crown.

[3] In terms of section 26 of the 2016 Act the inquiry must determine certain matters, namely; where and when the death occurred; when any accident resulting in the death occurred; the cause or causes of the death; the cause or causes of any accident resulting in the death; any precautions which could reasonably have been taken and might realistically have avoided the death or any accident resulting in the death; any defects in any system of working which contributed to the death, and any other factors relevant to

the circumstances of the death. It is open to the Sheriff to make recommendations in relation to matters set out in subsection 4 of section 1 of the 2016 Act.

Introduction

[4] This inquiry was held into the death of Matthew Price. Mr Price died on 31 January 2018, at the age of 63, when he suffered a fatal injury while in the course of his employment as a maintenance technician at the Whitburn Waste Water Treatment works. He was found unconscious, having become accidentally trapped between the railing of a Final Settlement Water Tank and its rotating bridge, leading to compression of his chest and asphyxia from which he died shortly afterwards. He had apparently been attempting to carry out maintenance work while the bridge remained connected to the power supply, enabling it to continue rotating and trap him as it did so.

[5] The death of Mr Price was reported to the Procurator Fiscal (hereinafter referred to as “the Crown”) on 1 February 2018. The First Notice intimating the Crown’s intention to hold this Fatal Accident Inquiry was lodged with the Sheriff Clerk on 18 October 2019.

[6] A preliminary hearing was held on 13 December 2019 and 9 January 2020. The Hearing of evidence in the inquiry commenced on 28 January 2020, and following an interruption because of the national COVID emergency, it was concluded on 28 October 2020.

[7] Throughout the proceedings, Ms Caldwell, Procurator Fiscal Depute, represented the Crown. Mr Gray, QC, represented the deceased’s employers, Veolia

Water Outsourcing Ltd (“Veolia”). The family of Mr Price were represented by Ms Forbes, Advocate.

[8] I was greatly assisted by the extensive preparatory work carried out by the Procurator Fiscal Depute, counsel and the expert witnesses, in focussing the issues for the inquiry and for the cooperative and professional communications between them which this entailed. This facilitated the production of a joint minute of admissions, and a joint note prepared by the expert witnesses highlighting areas where they agreed and disagreed.

[9] The inquiry heard from a number of witnesses, whose statements and reports were lodged and referred to in the course of their oral evidence. In addition, the Inquiry considered a number of other documentary productions lodged by the parties; such as emails, work orders, risk assessment documents, photographs, reports, working procedures, maintenance system records, diagrams, statutory and HSE Guidance and training records.

[10] The witnesses examined were:

For the Crown:

- a. Colin Buchanan, - Operator, Veolia
- b. Darren Hughes, - Maintenance Technician, Veolia
- c. Ewen Bryce, - Maintenance Engineer, Veolia
- d. Robert Wilson, - Shift Maintenance Engineer, Veolia
- e. Kyle Taylor, - Mechanical Maintenance Apprentice, Veolia
- f. Simon Skibtschak, - Business Assurance Adviser, Veolia

- g. James Keast, - General Manager, Veolia
- h. Robin Monk, - Health and Safety Adviser, Veolia
- i. Daniel Neill, - Former HSE Specialist Inspector (Electrical)
- j. Garry Miller, - HSE Inspector
- k. Ian Alton, - Maintenance Delivery Manager, Veolia
- l. Rosemary Saunderson, - HSE Inspector
- m. David Gostick, - HSE Specialist Inspector (Mechanical Engineering)

For the deceased's family:

- n. Stan Johnston, - Consulting Forensic Engineer (Health and Safety)

For Veolia:

- o. Ian Pugh, - Risk and Assurance Sector Head, Veolia
- p. Stephen Flanagan, - Consultant in Occupational Safety and Health.

[11] The joint minute covers a number of facts which were not in dispute. In terms of the joint minute, it was agreed that:

- (1) Mr Price was born on 3 August 1954. He died on 31 January 2018 at 11.12 hours and the cause of death was certified as 1(a) Chest trauma associated with probable mechanical asphyxia due to 1(b) Compression of the chest between the railings of a settlement water tank and a rotating bridge for the medical reasons set out in Crown Production Number 32, which report is agreed as accurate for its terms;

(2) That Crown Production Number 10 is an accurate image of Whitburn Waste Water Treatment Works, where the fatal accident involving Mr Price occurred. The location of the accident is the point marked 'Final Tanks (w)' on said image. The administration block for the site is the building under the annotation 'inlet works' on said image.

(3) That the locus is Whitburn Waste Water Treatment Works, which serves a population of approximately 10,000 persons. It is a conventional sewage works with treatment consisting of screenings, primary settlement, secondary treatment, nitrifying trickling filters and sand filters.

(4) That the final settlement tank, where the accident occurred, is a circular tank with a base that slopes towards the centre. A half-bridge scraper circumvents the tank directing the sludge which settles towards the centre of the tank from where it gravitates to a pumping station. The clarified effluent overflows around the perimeter and into the channel of the tank and gravitates to the next stage of treatment.

(5) That one rotation of said bridge takes approximately 13.5 minutes to complete. That direction of the bridge rotation is anti-clock wise, when viewed from above. A sensor notes when the bridge passes a point near the gate. Every time the bridge passes this point, a counter resets and counts down from 3,600 seconds. The bridge last reset at 08.45 hours before the accident. The bridge was not moving continuously between 08.45 hours and 09.45 hours. As it takes

approximately 13.5 minutes for the bridge to complete a full resolution, the bridge should have passed the sensor at approximately 09.00 hours.

(6) That Mr Price was working for Veolia as a maintenance technician at the time of said fatal accident. He had worked at different sites throughout Scotland as a maintenance engineer for Veolia since 2007. Prior to this Mr Price had worked for Thames Water Utility Services, also in a maintenance role.

(7) That in 1999, the Scottish Water Private Finance Initiative (PFI) for the upgrade, operation and maintenance of Almond Valley, Seafield and Esk (AVSE) water treatment sites between Scottish Water and Stirling Water Seafield Limited commenced. The waste water treatment works at Whitburn are included in the AVSE sites. The operation and maintenance obligations in respect of the AVSE sites which Stirling Water Seafield Limited has under the Services Agreement with Scottish Water were subcontracted in 1999 as part of the PFI structure to Thames Water Services Limited. In 2007, Veolia Water UK Limited (VWUK) purchased 100% of the equity in Thames Water Services Limited and renamed it Veolia Water Outsourcing Limited. Veolia is a private limited company which operates under the global Veolia Group, and more directly under the umbrella of Veolia Water UK Limited.

(8) The accident occurred at Final Settlement Tank No. 2 (west) at the waste water treatment works in Whitburn. This is one of four final settlement tanks of similar construction at the site.

- (9) Waste water enters the final settlement tank from processes on the site. The treated sludge is allowed to settle. The moving bridge holds curtains below the water level and pushes the settled sludge towards the centre of the tank, where it is pumped out. Clarified (cleaned) water flows off at a higher part of the tank.
- (10) That the settlement tank is surrounded by a three-rail perimeter fence, which has a hinged metal gate.
- (11) Mr Daniel Neil, Specialist HSE Inspector (Electrical), confirmed that the electrical control system on the moving bridge of Final Settlement Tank No. 2 was functioning. He found that there were no issues with the isolation switch, emergency stop or control buttons preventing them from functioning correctly.
- (12) That Crown Production Number 4 is a technical drawing of said final water settlement tank.
- (13) That Crown Production Number 5 is the risk assessment for final tank maintenance by Veolia dated 25 May 2017.
- (14) That Crown Production Number 6 is an open work order, which Mr Price had received before he attended the Whitburn site on 31 January 2018.
- (15) That Crown Production Number 7 is an open work order, which Mr Price had received before he attended the Whitburn site on 31 January 2018.
- (16) That Crown Production Number 8 is the work order which Mr Price received during his shift on 31 January 2018.

(17) That Crown Production Number 9 is the maintenance plan for the site for the week commencing 29 January 2018.

(18) That Crown Production Number 11 is a closed work order, which shows that Mr Price changed the tyre of Final Settlement Tank No. 1 on 27 March 2017.

(19) That Crown Production Number 12 is a closed work order, which shows that Mr Price changed the tyre on the primary settlement tank in 2016.

(20) That Crown Production Number 13 is a closed work order, which shows that Mr Price completed work on the final settlement tank on 12 February 2014.

(21) That Crown Production Number 14 is the risk assessment sign off sheet for final tank maintenance and bears the signature of Mr Price, dated 31 January 2018 confirming that he had read and understood the risk assessment and agreed to follow the identified control measures.

(22) That Crown Production Number 15 is an Excel Spreadsheet detailing work orders at the site between 2015 and 2018. The highlighted sections show work completed on the final settlement tanks during this period.

(23) That Crown Production Number 16 is a Book of Photographs taken by Gary Miller, HSE Inspector, during site visits on 1 February 2018 and 8 February 2018, which are more particularly described in the appended List and Description of Photographs.

(24) That Crown Production Number 17 is a Book of Photographs taken by Rosemary Saunderson, HSE Inspector, during site visits on 31 January 2018,

1 February 2018, 28 March 2018 and 6 September 2018, which are more particularly described in the appended List and Description of Photographs.

(25) That Crown Production Number 19 is a certificate, which was awarded to Mr Price on his successful completion of 'Managing Safely', a course approved by the Institution of Occupational Safety Services and Health on 4 December 2015.

(26) That Crown Production Number 20 is a certificate, which was awarded to Mr Price on his successful completion of a Risk Assessment course approved by Veolia on 18 March 2015.

(27) That Crown Production Number 21 is a certificate, which was awarded to Mr Price on his successful completion of a 'Safe Mechanical Isolation in the Water Industry Training' approved by Technical and Vocational on 11 December 2014.

(28) That Crown Production Number 22 is a certificate, which was awarded to Mr Price on his successful completion of a 'Behaviour Based Safety Course' approved by Veolia.

(29) That Crown Production Number 23 is a Guidance document produced by Veolia on the safe isolation of Process plant and equipment.

(30) That Crown Production Number 24 is the risk assessment for sludge blanket measurement by Veolia dated 23 April 2018.

(31) That Crown Production Number 25 is a list of daily operational tasks to be completed by operators at the site.

(32) That Crown Production Number 31 is a Guidance document produced by Veolia on the Permit to Work system.

(33) That Crown Production Number 33 is a certificate, which was awarded to Mr Price on his attendance at the Veolia course on the Water Permit to Work Procedure on 19 April 2013.

(34) That Crown Production Number 34 is the improvement notice, which was served on Veolia on 26 March 2018.

(35) British Standard (BS EN 12255 “Wastewater treatment plants”) is the standard that applies to the final settlement tank. The standard makes no mention of trapping hazards. That Crown Productions Number 35 and 36 are the British Standard applicable to final water settlement tanks, namely Part 1 and Part 10 respectively.

(36) That Crown Production Number 37 is the Guidance document issued by the Health and Safety Executive relating to ‘Risk Assessment’.

(37) That Crown Production Number 40 is a process line diagram showing pipework connections at the site.

(38) That Crown Production Number 41 is the risk assessment for FST Blanket Level Detectors dated 20 March 2015.

(39) That Crown Production Number 43 is the Veolia Training Power Point in relation to the Permit to Work system.

(40) That Crown Production Number 44 is an example of the Veolia Lone Working Assessment Check Sheet.

(41) That Crown Production Number 45 is the Veolia Lone Working Procedure dated December 2015.

(42) That the lone working procedure provider for Veolia is Orbis and Crown Productions Number 46 to 49 are lone working information sheets provided by the lone working provider Orbis.

(43) That Crown Production Number 50 is an example of a screenshot provided by Veolia's Computer Maintenance Management System (CMMS). This is what operatives can see on their computers when they are allocated tasks, which includes the task instructions.

(44) That Crown Production Number 51 is an isolation training document produced by Mechanical and Electrical Training (MET) in relation to 'Safe mechanical isolation in the water industry'.

(45) That Crown Production Number 53 is a copy letter, which was sent to Veolia on 26 March 2018 by Rosemary Saunderson, HSE Inspector.

Summary

The day of the accident: 31 January 2018

[12] On the morning of 31 January 2018, Mr Price attended the waste water treatment site operated by his employers, Veolia, at Ellen Road in Whitburn, where he was due to work on maintenance jobs for the day.

[13] On that morning, Colin Buchanan, Mechanical Operator, conducted routine checks on the plant on site. One issue he noted was that the tyre was detaching from the

drive wheel on the moving bridge of the Final Settlement Tank No. 2 (west). He noted that the tyre was only partially detached from the wheel and the moving bridge was still rotating at that time.

[14] Mr Buchanan returned to the administration building. Mr Price was working on the computer in the office. Mr Buchanan told Mr Price of the issues he had noticed, and also reported these issues to the maintenance co-ordinator, Mr Ronnie Lawler. A work order was subsequently issued for the planned corrective maintenance to “repair drive wheel” (Crown Production Number 8) and allocated to Mr Price. The repair was classified as a Priority 3 Planned Corrective Maintenance item, requiring completion within 72 hours (i.e. by 3 February 2018). The Whitburn site operation would not be seriously compromised if the final settlement tank had to be taken offline for maintenance to be carried out, because tankers could take sludge to other sites for processing if necessary. It was therefore not a high priority job, and Mr Price was not under pressure to deal with it immediately.

[15] Prior to attending at the Final Settlement Tank No. 2 (West,) Mr Price signed the risk assessment sign off sheet (Crown Production Number 14) to confirm that he had read the risk assessment for Final Settlement Tank maintenance (Crown Production Number 5).

[16] At approximately 09.00 hours Mr Price put on his work overalls and said that he would go to look at the wheel. He then walked away in the direction of the final settlement tanks, leaving his works van parked outside the administration office. He was not noted to be carrying anything with him at that time.

[17] At approximately 09.20 hours, Mr Simon Skibtschak, a Business Assurance Specialist, arrived on site. He had arrived early for a pre-audit meeting and wanted to speak to Mr Buchanan, who he knew was due to leave the site at 10.00 hours.

[18] Mr Skibtschak noticed a person in high visibility clothing in the vicinity of the final settlement tanks when he arrived on site. He was informed that this was Mr Price. He did not recall specifically whether he had seen Mr Price moving at that time. He had, however, not noted anything that caused him concern.

[19] At approximately 09.45 hours, Mr Buchanan packed his van to leave the site. He stopped his van at the Final Settlement Tank No. 2 (west) to tell Mr Price that he was going to a different site but would return later. As he approached, he saw Mr Price slumped over between the top and mid rails of the perimeter fence round the tank. At first, Mr Buchanan thought Mr Price was joking about, as he was known to do. As he got close, however, he realised that this was clearly not the case. He shouted to Mr Price but got no response. He then ran over and saw the wheel of the bridge turning. The tyre was completely detached.

[20] When Mr Price was found, he was leaning between the top and mid-rails of the perimeter fence around the tank, in an almost kneeling position with his arms hanging down in front of him and facing in towards the tank. The moving bridge of the tank was against his rib cage, pushing him against the upright stanchion of the perimeter fence as dictated by the anti-clockwise direction of the bridge rotation. He was crushed against the first stanchion after the gate in the perimeter fence.

[21] Mr Buchanan hit the emergency stop button and tried to pull the bridge back to release Mr Price, but the scraper bridge was too heavy and he was unable to move it by himself.

[22] Mr Buchanan returned to his vehicle and sounded the horn to get help.

Mr Skibtschak heard the horn and came to see what was happening. An ambulance was called. Mr Buchanan and Mr Skibtschak together managed to pull the bridge away to release Mr Price and place him on the ground. Mr Price was limp when he was removed from his position in between the middle and top railings. His face was purple in colour. He was unconscious. CPR was performed until the emergency services arrived.

[23] A doctor pronounced life extinct within the rear of an ambulance outside the BP garage, Deer Park Drive, Livingston.

[24] When Mr Price was found, he was wearing his work clothing; including a hard hat and a high visibility jacket. No work tools were found in the vicinity of Mr Price or on his person at that time.

[25] There were no eyewitnesses to the accident, and the area was not covered by CCTV surveillance.

Post-Accident Investigations

[26] The accident was subsequently initially investigated by Police Scotland and then by the Health and Safety Executive ("HSE").

[27] On 1 February 2018 Veolia commenced an internal investigation. Mr Skibtschak was asked to confirm the position in which he found Mr Price. Figures 9 and 10 of the report are photographs showing the position in which Mr Price was found.

[28] Mark Keast, General Manager, confirmed that the scene of the accident had been secured on 31 January 2018, and was examined on the following day by the Veolia investigation team. He spoke to the discovery of a lump hammer in the channel of the settlement tank immediately below the motor of the drive wheel and the position at which Mr Price had been found. The hammer was subsequently examined and the court was offered an interpretation of what Mr Price had been doing at the time of the accident based on the position in which he was found, the location of the hammer and corresponding marks on the hammer and motor. Counsel for Mr Price's family invited me to come to a different conclusion. This is clearly a significant finding in relation to the causation of Mr Price's accident.

[29] Daniel Neill, HSE Specialist inspector (Electrical), attended the Whitburn site the day after the accident. After testing, he found that the controls for the rotating bridge were functioning correctly and could be operated over the top rail of the perimeter handrail without having to access the rotating bridge. The bridge could be stopped and started by operation of the controls. No electrical fault was noted which could be a cause or contributory factor in the accident.

Final Settlement Tank function, maintenance and repairs

[30] Whitburn Waste Water Treatment Works is a conventional sewage works with treatment consisting of screening, primary settlement, secondary treatment, nitrifying trickling filters and then sand filters. The plant had been operated in that mode at the Whitburn site without significant modification for some 18 years prior to the date of the accident.

[31] The Final Settlement Tank was designed and built in 1972. A British Standard (BS EN 12255:2001) for wastewater treatment plants was introduced in 2001. In 2012 some repairs were carried out the outer concrete wall on which the bridge traverses. These works were carried out by Tusk, in accordance with the Design Standards for Final Settlement Tanks.

[32] The Final Settlement Tank is a circular tank with a base that slopes down towards the centre to provide a conical bottom end. A half bridge scraper forms a radius which rotates around the centre point of the tank. This directs the sludge, which then settles towards the centre of the tank, from where it gravitates to a pumping station. The bridge moves slowly so as to effectively pass below a sludge blanket. The clarified effluent overflows around the perimeter and into a channel running round the edge of tank and gravitates to the next stage of treatment.

[33] An isolation switch and an emergency stop switch are mounted on the railing near the outer edge of the bridge. In addition to the isolation switch which cuts the power to the machinery, employees have issued to them a personal padlock to

physically lock out access to the isolation control, and so prevent the bridge machinery being inadvertently re-engaged.

[34] The emergency stop switch is situated at a height of 105 cm above the deck of the bridge. It is located 36 cm from the end of the bridge handrail and 53 cm from the perimeter fence railing. This leaves a gap of 8 cm between the bridge handrail and the perimeter fence stanchion.

[35] The bridge drive mechanism includes a sensor which detects the movement of the bridge. As the end of the bridge passes the sensor, a counter is reset. If the end of the bridge did not pass the sensor within one hour of the last reset, an alarm would sound at Veolia's manned site at Seafield. The bridge would not be automatically stopped because this alarm is an operational control - to alert staff that there is a problem with the rotation - rather than a safety measure.

[36] The Tank is subject to a planned programme of maintenance on a monthly and six monthly basis. The inspections are carried out by Veolia in-house employees, being either maintenance technicians or maintenance engineers. Planned preventative maintenance is predominantly carried out by maintenance technicians, with corrective actions being undertaken by engineers. The sourcing of replacement items for any maintenance task is managed through a stock requisition ordering system. The request is generated and submitted to the stores personnel at the Veolia Seafield site.

Individuals cannot order replacement parts, etc. directly.

[37] There were three types of maintenance work - planned, reactive and preventative. According to Ewan Bryce, reactive maintenance was normally where

cause of the problem was unknown. A Maintenance Technician would first find the risk assessment within the folder in the office, read it and sign it and then go and have a look and try to work out what the problem was. There were no maintenance tasks that would be undertaken while the bridge was moving - other than an assessment. The bridge might have to be moving to assess the fault. In his experience you would “walk the job” i.e. go and physically look and see what the problem was, discover the fault and identify the tools you would need to fix it. In relation to a fault with a drive wheel, you would need to look at the job first. There were a multitude of things that could go wrong. If the scraper bridge was still capable of turning, then you would wait until bridge came around to the gate before trying to stop it. That would allow for easier access to the bridge. You would stop the bridge by using the stop button or emergency e-stop button, which were accessed by reaching over the railings and hitting it with your hand.

[38] The moving bridge has wheels situated at the outer end, which support the bridge as it travels anti-clockwise around the circumference of the tank. There is a leading wheel in front of the bridge and a trailing wheel behind it. The front wheel is the drive wheel and is powered by a motor attached to it. The rear wheel is not powered. It only supports the weight of the bridge as it sweeps round. The wheel has a diameter of approximately 30 cm with the tyre in place. The width of the wheel is approximately 5 cm.

[39] The drive wheel tyre is bonded onto the wheel by the supplier. This cannot be done as a repair on-site or in a Veolia workshop. Both the wheel and the tyre therefore

have to be replaced as a unit. The wheel replacement unit for the Final Settlement Tank is subject to a 24 hour replacement arrangement with the supplier.

[40] The normal procedure when a wheel/tyre unit needs to be replaced is to isolate the bridge from the power supply to prevent it moving. To do this, the operative could either use the controls on the bridge or in the nearby building, depending on if it is safe to access the bridge in the position where it is stopped. The bridge is then jacked up to allow the wheel unit to be replaced.

Expert Evidence

[41] David Gostick gave evidence for the Crown and spoke to his expert report (Crown Production Number 52). He is employed by HSE as one of HM Specialist Inspectors (Mechanical Engineering). He joined HSE in 2012 and prior to that had 20 years of experience as a design and project engineer in the aerospace and scientific instruments industries.

[42] Mr Gostick attended the Whitburn site several weeks after the accident. He made a number of measurements and calculations. He took photographs of the bridge, controls and surrounding area. From the tank dimensions and rotational speed of the wheels, he calculated that the outer end of the bridge moves at 3.51m per minute. He notes that although this is a low speed, serious or fatal accidents can still occur unless adequate controls are in place. At that speed, it would take 30 seconds for the bridge to move from the stanchion at the access gate to the next stanchion. From information he obtained from the manufacturers about the drive motor, he was able to calculate the

horizontal crush force that the bridge guard rail was capable of applying due to motor torque.

[43] Mr Gostick described the framework of regulations and standards applicable.

The general standard for machinery safety is the “Safety of machinery – General principles for design – Risk assessment and risk reduction” (ISO 12100:2010). The introduction to this standard sets out that its purpose is to provide designers with an overall framework and guidance to enable them to design machines which are safe for their intended use. This is an international standard, which classifies standards as follows:

- a. Type A standards – these are basic safety standards giving basic concepts, principles for design and general aspects that can be applied to machinery.
- b. Type B standards – these are generic safety standards dealing with one safety aspect or one type of safeguard that can be used across a wide range of machinery.
- c. Type C standards – these contain detailed safety requirements for a particular machine or group of machines.

If there is a conflict between a type B and a type C standard, the type C standard takes precedence.

[44] The principal standard for waste water treatment works is BS EN 12255. Part 1 deals with general construction principles. Part 10 concerns safety principles. The standard specifies the railings which are necessary to prevent a fall into the tank, but does not give guidance on the need to safeguard the rotating bridge mechanism to

prevent crushing injury. Mr Gostick expressed the view that in the absence of a type C standard for bridge drive mechanisms, it would be necessary to consult both the Provisions and Use of Work Equipment Regulations 1998 ("PUWER") and more general standards for guidance as to appropriate levels of safeguarding.

[45] BS EN 14120:2015 and its predecessor give more detailed guidance on the general requirement for guards on machinery. Paragraph 5.3.2 states that "Guards shall be designed so as not to cause hazardous crushing or trapping points with parts of the machine or other guards".

[46] In his view, two risks of crushing were presented by the moving bridge. Firstly, the small size of the gap between the bridge and perimeter guard-rails together with the high power and torque of the drive mechanism constituted a significant risk of injury; and secondly, the in-running nips of the two outer wheels of the bridge were unguarded. These risks were not specifically mentioned in the Veolia risk assessments. For that reason, he criticised the risk assessments and suggested that these risks and their associated controls should be detailed separately within the risk assessment of the plant.

[47] With regard to the first of these risks, Mr Gostick thought it would be reasonably practicable to fit fixed guards around the drive and support wheels and this should be carried out to comply with the hierarchy of guarding set out in PUWER.

[48] With regard to the risk of crushing between the fixed and moving guard rails, he was of the view that some "relatively simple" measures could significantly reduce the risk of an accident. He suggested filling in the gaps in the perimeter guard rails and to

eliminate gaps larger than 40 mm and fitting an interlocking device to the gate so that opening it would stop the bridge rotating. He also suggested fixing the outer ends of the bridge guard-rails with moveable sections which could be locked out of the way when the bridge is rotating and engaged when the bridge is stationary and access was required. Finally, he suggested fitting pressure sensitive edges to the ends of the bridge guard-rails to stop the rotation if the sensors detected resistance pointing to an obstruction in the way.

[49] At paragraph 4.36 of his report (Crown Production Number 52), Mr Gostick notes that while the hierarchy of guarding would require the provision of fixed guards because the consequences of crushing could be severe, the likelihood of an accident of this kind was low. This type of equipment is very common, but he was not aware of any similar incidents. Furthermore, Mr Gostick acknowledged that, "... it may also be reasonable to control the risk through the implementation of safe systems of work ...", though the caveat is that such systems of work are prone to human error. For that reason his opinion was that the use of guards or other protective devices was required by the hierarchy of guarding under PUWER even if the system of work could be said to be safe.

[50] Mr Gostick carried out an examination of damage to the hammer found in the tank channel, and compared that to signs of damage on the wheel. He noted that the hammer had been found below the point in the railings where Mr Price had been found. His evidence was that there was a correlation between damage to the edge of the drive wheel and the copper face of the hammer, which was reinforced by similarly coloured

paint marks on both items. He concluded that Mr Price had been using the hammer to knock the tyre back onto the wheel, and the damage to both items had most likely occurred during that process. Mr Price would have had to lean through the guard rail in order to reach the wheel from the perimeter of the tank.

[51] In relation to the location of the stop controls on the bridge, he thought these were poorly sited and that because of the shrouding of the operating controls, it was easier for operators to use the e-stop button. This is not the use emergency controls are intended for. Mr Gostick suggested it would be reasonably practicable to re-site the controls in an unshrouded way and by turning them to face the perimeter and moving them further out.

[52] He ultimately concluded that the system of work being followed by Mr Price at the time of the accident was not safe because he had not followed the guidance to isolate the electrical power before carrying out mechanical work. Had he isolated the machine, then it would not have been possible for him to be crushed.

[53] Stan Johnston is a consulting engineer with an area of expertise in Health and Safety Forensic engineering. He has been doing expert witness work for approximately 25 years and in that time he has submitted expert reports and appeared as a witness in court on numerous occasions. Most of his work is on behalf of agents for pursuers in reparation actions, but he also undertakes work for insurance companies defending such claims. He produced a report in this case (Production Number 1 for the Family) to which he spoke in evidence.

[54] Mr Johnston had attended at the Whitburn site in May 2019 when he took photographs and viewed the area of the accident. He later viewed Veolia documentation and met with the other expert witnesses to contribute to their joint report.

[55] Mr Johnston expressed the view that he would not expect someone of Mr Price's experience and knowledge to try to hammer a plastic tyre with the copper end of a hammer. There would be a significant risk in damaging the tyre by doing that and if you were to attempt such an endeavour, the softer hide side of the hammer would be better to use.

[56] He agreed with the evidence of Mr Gostick that the rotating bridge and guard-rails in close proximity to the perimeter mid rail and stanchion posed a significant crush hazard to most parts of the body. The high power and torque of the drive mechanism meant that the potential crush forces were significant and had the potential to cause serious or fatal injuries. The risk assessment did not identify this crush hazard, and was therefore inadequate.

[57] Mr Johnston's evidence was that the moving bridge represents "dangerous parts of machinery" so as to bring it within Regulation 11 of PUWER. The hierarchy of controls in Regulation 11 are that an employer must ensure effective measures are taken to prevent access to dangerous parts of machinery or stop movement of the dangerous machinery before any part of a person enters a danger zone. The measures are the provision of fixed guards enclosing every dangerous part if it is practicable to do so. If not practicable, the duty is to provide other protection devices. Thereafter, if that is not

practicable, the requirement is to provide protection appliances for use with the machinery. If none of that is practicable, the duty is to provide such information, instruction, training and supervision as is necessary.

[58] Mr Johnston observed that the bridge was automatically operated, and capable of being controlled - or at least stop/started - remotely. It was not under the supervision of an operator. This can often be more dangerous because a machine is unable to tell if someone is in a risky position. The slow speed of the bridge would give someone time to remove themselves from danger, but only if there was something to alert them to that danger. Low speed could lead someone to think that the bridge was not moving. He disagreed with Mr Flanagan's assessment that the machinery was not dangerous - the fact that the accident had occurred illustrated the nature of the danger.

[59] In his view the location of the stop button and emergency stop button was not adequate. Although the e-stop button was located much closer to the bridge access point, an operative would have to lean beyond the handrail to activate either control.

[60] Mr Johnston referred to the Water Industry Mechanical and Electrical Specification 8.03 issue 4 dated August 2016 ("WIMES") (Crown Production Number 71) agreed by all the water companies in the UK, including Scottish Water. At page 26 it states that machinery located in open areas, tanks, wells, channels, etc. should be surrounded by walls or hand railing, with mesh infill panels and access gates.

Mr Johnston agreed with Mr Gostick's view that the gaps in the outer perimeter guard-rail and gate should be infilled so that no gaps would exceed 40mm.

[61] In response to Mr Pugh's evidence that the alarm linked to the bridge sensor was only for operational purposes and not a safety control, Mr Johnston was of the view that there would have been a number of reasons for the alarm; one of which was to protect the drive motor in circumstances where something or someone was preventing the bridge from moving, and for safety. A full rotation of the bridge would take 13.5 minutes. The alarm interval had been reset from the original 15 minutes to 60 minutes for operational reasons, meaning that the potential lapse of time before an alert would sound would render it ineffective as a safety precaution. He thought that the sensor/alarm should have caused the power on the bridge to cut off. The end of the bridge could be fitted with pressure sensors and/or a "magic eye" to detect issues hindering rotation.

[62] He also gave evidence that a further cheap measure which could be put in place would be to put chain link fencing over the handrail all the way round to prevent anyone putting any part of their body through the fence.

[63] He disagreed with Mr Flanagan that a safe system of work was an appropriate control measure. He acknowledged that this was a crucial part of every task, but it did not replace the need for guarding. In other words, you must protect by taking the risk away and not by just giving instructions.

[64] Mr Johnston discounted the theory that Mr Price had been attempting to repair the detached tyre without isolating the machinery from the power supply. He based this firstly on Mr Price's lengthy work experience and safety track record, and secondly,

what he thought to be the futility of attempting a temporary running repair by hammering the tyre back on.

[65] Mr Johnston was not impressed with evidence of the corresponding damage and paint marks seen on comparison of the surfaces of the hammer and the wheel. He thought that the marks on the hammer head were all straight lines, whereas he would have expected marks in a “sliver of moon” shape. At best, the marks on the tyre and hammer were neutral.

[66] Mr Johnston’s report assumes a working hypothesis that Mr Price must have slipped or tripped on approaching the drive wheel for the purpose of inspecting it and then fallen awkwardly though the railings. His report does not mention at all the competing hypothesis that Mr Price had been working on the machine without isolating it from power. Despite the circumstantial evidence suggesting otherwise, he was not even prepared to accept that the hammer recovered belonged to Mr Price.

[67] Stephen Flanagan was instructed as an expert witness by Veolia. His report is Production Number 1 for Veolia. He is a consultant in Occupational Safety and Health. He has more than 28 years’ experience advising in the area of health and safety and technical standards. He was an Inspector and subsequently Principal Inspector with HSE for over 20 years. He has extensive training and experience in machine safety and generic hazards applying across industry. Inspectors under his supervision were involved in the waste industry. His experience includes undertaking enforcement proceedings in England on behalf of HSE such as Prohibition and Improvement Notices

and the issuing of criminal proceedings. He has extensive experience of acting as an expert witness in the field of health and safety.

[68] Mr Flanagan's evidence was that there was a mature and well developed safety management system in place at the Veolia site at Whitburn. He referred to the "Think Safe" system of dynamic risk assessment. There were written procedures for lone working. Veolia operated a comprehensive health surveillance system. They provided training to operatives. The training afforded to Mr Price is well documented in the training records.

[69] Mr Flanagan confirmed that Veolia had a duty to conduct a risk assessment as required by Regulation 3(1) of the Management of Health and Safety at Work Regulations. He made the point that the risk assessment is the mental process of analysing the risk. The requirement to record the significant findings of the risk assessment is a quite separate requirement imposed by Regulation 3(6). The Regulation 3(1) duty was framed so as to apply "for the purpose of identifying measures ... to comply with the requirements and prohibitions ... imposed ... by or under the relevant statutory provisions". In his view therefore a risk assessment will be suitable and sufficient to comply with Regulation 3(1) if it can be demonstrated that the control measures identified and put in place meet the requirements of the statutory provisions applying in the circumstances.

[70] As Mr Price became trapped between the edge protection of the moving bridge and the edge protection of the static tank, it was appropriate to consider the physical design of the edge protection and any standards which applied. "Good Practice" is set

out in BS EN 12255-10: 2001 "Wastewater treatment Plants" Part 10 "Safety Principles" (Crown Production Number 36). Part 4 of that Standard deals with specific kinds of hazards.

[71] Paragraph 4.5 is relevant to the edge protection requirements for the tank in question. The requirement is to provide suitable protection against falling, and stipulates that the protective barriers are to be constructed so as to prevent persons falling through. The Standard does not require any particular provision to prevent access to moving parts of the machinery such as the bridge. From this, Mr Flanagan concludes that the authors of the Standard did not consider there to be significant machinery hazards which needed to be included in the provisions.

[72] From his experience of the waste water industry, he was able to say that the edge protection in place around Final Settlement Tank No. 2 (west) was typical for the industry, and in his view it complied with the Standard. The risk associated with the tank was that of falling into the tank. Protection was neither necessary nor intended to prevent all possible approach to machinery. That made sense because the tanks run automatically for long periods of time without any operative present. No operational tasks have been identified which would require an operative to lean through or breach the perimeter guard-rails. The only interventions would be for maintenance purposes, which would require working inside the edge protection anyway - and with the machinery isolated. For that reason, according to Mr Flanagan, the provision of edge protection is irrelevant to maintenance activities.

[73] Mr Flanagan's evidence about the significance of the speed of travel of the bridge was that the slow speed (in excess of 12 minutes to complete a rotation) did not create a significant entrapment hazard. He cited practical examples of slow moving machinery in other industries which were accepted not to require guarding.

[74] In relation to the risk assessment, his opinion was that the key to achieving safe maintenance is by having in place a safe system of work. The Veolia risk assessment recognised crushing hazards and identified the key control measure as "when working on bridge drive and structure local isolation is in place ensuring bridge is unable to start". He concluded that the risk assessment therefore identified suitable control measures and the summary of significant findings were set out in adequate detail. The more comprehensive the guarding (a "hard control"), the more likely it will need to be removed for maintenance; hence the need for a "soft control" such as an isolation procedure.

[75] There was nothing to alert management that Mr Price would not follow the established isolation procedure. While it may have been reasonably foreseeable that Mr Price would go to the tank to assess the task or even attempt to repair the drive wheel, he did not consider that it was reasonably foreseeable that he would attempt a repair without isolating the machinery, given his experience, his awareness of the established isolation procedure and the requirement for him to review that risk assessment before carrying out any repair task. His appraisal is that the evidence points to human error on the part of Mr Price as the underlying cause of the accident, through a lapse or failure to follow the isolation requirement.

Submissions

Crown Submissions

[76] There were a number of pieces of evidence pointing to the cause of Mr Price's accident.

[77] A hammer was found in the water directly under where Mr Price had been found the following day. Examination of the hammer showed blue marks - similar in colour to the paint colour of the drive unit. Both the HSE examination and the Veolia investigation identified that the damage was fresh, because no discolouration or rusting had accumulated on either the hammer or the wheel arch.

[78] The physical evidence of the hammer being found in the channel, the fact the power of the drive was on when he was found, in combination with the position that Mr Price was found in, altogether indicates that it is most likely that he had been trying to fix the drive wheel. A slip, trip or fall is not considered to explain the position Mr Price was found in. Examination of the machinery showed that the bridge motor was working properly, as were the isolation switch and the stop and emergency stop controls. There was no mechanical or electrical fault which could have contributed to the accident.

[79] As to why Mr Price would have been attempting to repair the drive without isolating the bridge, it was accepted that he was very experienced. He had been a Health and Safety representative and was trusted by Veolia Water to train others. He had received training himself including in relation to how to isolate machinery prior to

working on it. A number of witness thought that it would be futile to try to effect a temporary repair in this way, but nonetheless this was possible to do. If the machine was moving, this made it easier to put the tyre back on.

[80] The Crown suggested that it would perhaps be in keeping with Mr Price's work ethic to have tried to keep the machine operating in the interests of his employers and pride in his job. Although there was no immediate urgency to get the bridge moving again, the tank flow was important enough for its continuing rotation to be regularly monitored. Replacement wheel units were then not kept on site and could not be immediately replaced.

[81] It was agreed by all parties that British Standard (BS EN 12255 "Wastewater treatment plants") applies to the Final Settlement Tank. The standard makes no mention of trapping hazards.

[82] BS EN 12255 is a C-type standard, which is the machinery safety standard applicable to wastewater treatment plants, and in particular to the final settlement tank. Part 10 confirms that "compliance with a British Standard does not itself confer immunity from legal obligations". The scope of the standard is specified on page 4, namely, that the Standard defines the safety requirements for wastewater treatment plants in relation to how they are constructed and reconstructed.

[83] The Crown challenged Mr Flanagan's inference that the authors did not consider there were any significant machinery hazards. It was submitted that the Standard was not drafted to comply with the Machinery Directive, so that any risks associated with

the operation of the machine required to be separately assessed. It was submitted that Mr Gostick's evidence should be preferred to Mr Flanagan's on this point.

[84] It was submitted that adherence to BS EN 12255 alone cannot satisfy the legal obligations of an employer. The risks require to be assessed and UK legislation requires to be adhered to. In particular, an employer is required to consider the hierarchy of controls set out in PUWER.

[85] The Crown submitted that the moving bridge was a "dangerous part" within the meaning of the Approved Code of Practice issued by the Health and Safety Executive in relation to PUWER. At paragraph 141, it states that if a piece of equipment could cause injury, while being used in a foreseeable way, it can be considered a dangerous part.

[86] BS EN ISO 12100 (Crown Production Number 59/Court Number 75) section 5 describes the risk assessment to be undertaken when assessing whether machinery should be regarded as dangerous or not. Factors to consider include the frequency of the approach, and the sort of people who would approach the machine. The standard also includes precautions in the event of foreseeable misuse; namely use of a machine in a way not intended but that can result from readily predictable behaviour. Accordingly, by these tests, the moving bridge of the Final Settlement Tank could be considered a dangerous part of machinery. The evidence was that the moving bridge moves slowly but with significant force, and employees recognised it as a dangerous part.

[87] It could be argued that Veolia has not implemented the most effective measure i.e. fixed guarding but has implemented protective devices; namely the emergency stop button and isolation switches. These controls, in combination with the information,

instruction and training that has been provided to employees, may be considered to sufficiently mitigate the risk, given that all maintenance employees who gave evidence confirmed that work would not be carried out with the bridge still moving.

[88] Mr Gostick advocated possible improvements to the perimeter guarding, such as 1) using moveable interlocked outer ends for the access bridge handrails, 2) infilling the gaps in the outer perimeter fence and gate so that no gap exceeds 40mm and 3) fitting pressure sensitive edges to the bridge handrails. He also considered that the emergency stop button and stop button were poorly sited, and could lead to operatives leaning over or through the perimeter fence, increasing the risk of crushing and use of the emergency stop button inappropriately. If access to the perimeter fence had been restricted, this incident could not have occurred.

[89] Standing Mr Flanagan's evidence that any installing fixed guarding would require to be removed in order for maintenance employees to conduct their work, in the Crown's submission it was for Veolia Water to consider whether fixed guarding could reasonably be implemented.

[90] With regard to the bridge sensor, it was submitted that the sensor was to monitor the operational function of the bridge and that this was not a safety feature of the machine.

[91] Although Mr Gostick gave evidence from his technical assessment of the machine, that this accident was foreseeable, the risk of being crushed by the moving bridge must be viewed in the context of the individuals who would come into contact with the machine (i.e. trained, maintenance staff). The Crown also reminded me that

this is a machine which operates automatically with no need for a human operative to work it. Taking into account that there have been no previous accidents of this kind in the lengthy history of not just this tank but numerous others at different sites in the UK, and the common design and construction, the Crown submitted that this accident was not foreseeable.

[92] With regard to the adequacy of the risk assessment, this does not mention the trapping point between the rotating bridge and the fixed perimeter fencing around the tank. The risk assessment also does not explain when or how to use the isolation referred to. Isolation procedure is referred to in a separate guidance document, Veolia 'Final Tank Maintenance'.

[93] On one view, that could be said to give rise to a lack of clarity in the assessment. An Improvement Notice (IN) was issued to Veolia regarding this alleged lack of clarity. That is currently under appeal by Veolia.

[94] The Crown accepted however that this could not be said to have a bearing on the fatal accident. Evidence from maintenance employees showed that the written risk assessment does not reflect the complete picture. The reality was that all employees were well aware of these risks and the control measures - in particular the importance of using the isolation procedure. The risk of crushing between the moving bridge and the fixed perimeter fencing was a known risk, even without it being specifically identified in the risk assessment.

[95] There was therefore evidence of a clear procedure in place, which the employees had all been trained in and were fully aware of; and which, if followed, would have

avoided this accident. The key control measure, identified through the risk assessment, is isolation.

[96] BS EN ISO 12100 (Crown Production Number 59/Court Number 75) describes the process of risk assessment. It comprises risk analysis including risk identification and risk evaluation. The risk assessment takes account of any relevant standards, which in this case is BS EN 12255. Further other factors are to be considered, for example who is using the machinery. In this case it is predominantly maintenance and plant operatives, who are trained in isolation.

[97] In terms of the evaluation of the risk, the severity of the harm and probability of the harm must be considered. On page 20, in the top paragraph it states:

“Training, experience and ability can affect risk; nevertheless, none of those factors shall be used as a substitute for hazard elimination, risk reduction by inherently safe design measure or safeguarding, wherever these protective measures can be implemented”.

[98] The Crown submitted that on the evidence, Veolia Water had a safe system of work in place which included elements of training, risk assessment, and standard operating procedures. The cause of the accident was Mr Price leaning through the perimeter fence to attempt to replace the tyre on the drive wheel without ensuring that the bridge was isolated. Had Mr Price followed the correct procedure the fatal accident would have been prevented. The Crown did not therefore propose any findings under section 26(2) (e), (f) or (g) which were critical of Veolia.

Submissions on behalf of the family of Mr Price

[99] Counsel for Mr Price's family took issue with the hypothesis of how he came to be found in the position he was, and offered a competing scenario. It was further submitted that Veolia had failed in their duties under the regulatory framework and best practice guidance to provide an adequate risk assessment, apply correctly the hierarchy of controls for dangerous machinery and provide a safe system of working. Had this been done, it ought to have led to guarding of the moving bridge, closing of gaps between the rails and stanchions, fitting of detecting and automatic stopping devices and re-siting the e-stop and stop buttons.

[100] In relation to the finding of the copper and hide hammer similar to one that Mr Price would have used in his daily work, this was found in the channel of the tank near to where Mr Price was found. A visual comparison of markings on this hammer with areas of apparent damage to the recovered drive wheel was made by individuals working for Veolia. A hypothesis was put forward in evidence to the effect that Mr Price must have been leaning through the mid-rail of the perimeter guard-rail and attempting to effect a temporary repair to the drive wheel by trying to hammer the tyre back onto the metal rim using the copper side of the hammer.

[101] That was disputed. Counsel submitted that there are a number of problems with that hypothesis:

- (a) None of the witnesses had any real or substantive training in tool mark comparison, ageing marks on tools or accident reconstruction.

(b) The marks identified on the copper side of the recovered hammer which purported to be “newer” and caused by an attempt to hammer the tyre back onto the drive wheel were straight and not curved in the shape of a drive wheel.

(c) There were a number of older marks on the copper side of the recovered hammer of a similar nature in size and appearance. No explanation was offered as to how these older marks had been imposed onto the surface of the hammer. Given that there were older marks of a similar nature to the newer marks, the inference is that all of the marks both old and new could have been put there legitimately in the course of the hammer’s ordinary use. There was insufficient evidence to support the proposition that the only way these “newer” marks could have been made on the hammer was by an attempt by Mr Price to hammer the tyre back onto the drive wheel.

(d) Mr Johnston stated in evidence that he would not have expected someone of Mr Price’s experience and knowledge to try to hammer a plastic tyre with the copper end of a hammer. There would be a risk of damaging the tyre by doing that. In any event, the softer hide side of the hammer would be better to use than the hard side.

(e) It was apparent that older areas of damage to the drive wheel were also present showing rust and discolouration. No explanation was provided for that older damage. That damage could be caused to the drive wheel in the course of its ordinary use.

(f) Mr Buchanan gave evidence to the effect that when he found Mr Price, the tyre was further off the drive wheel and the metal wheel was turning on the concrete where the tyre had come off. It might be that any damage to the drive wheel could have been caused during the period in which Mr Price was trapped and the drive wheel was still attempting to rotate.

(g) Behaving in the manner suggested would be completely at odds with Mr Price's training. The practice was to always isolate the machinery at the bridge. To stop the rotating bridge, operatives would either press the e-stop button located on the stanchion for the guard-rail on the bridge or the red stop button on the local panel on the bridge. The isolator switch could then be turned, and a personal padlock used to keep it in place. Mr Price was trained and experienced in isolating prior to carrying out any work on moving machinery. He was so trusted in this regard that he had undertaken the role of a supervisor in the past and had been depended upon to supervise and train other operatives in the role of Maintenance Technician. His Veolia colleagues unanimously attested to his safety awareness.

(i) Attempting to repair the tyre in the manner suggested would be illogical and ineffective. The tyre had been bonded to the metal rim of the drive wheel at the factory, so that the drive wheel and tyre arrived as a complete pre-assembled unit. Once the bonding failed, the tyre would detach from the rim and the proper solution would be to remove the drive wheel and tyre as one unit and fit a replacement one. It would not be effective to try and hammer the tyre back on

whilst the bridge was moving. Darren Hughes gave evidence to the effect that in his view you would not be able to hammer the tyre back onto the drive wheel and that even if you were somehow able to, it would just come off again.

Ewan Bryce stated that technicians would not try to reconnect the tyre by hammering it back on. They knew that any such repair would not be permanent as glue was needed to bond the tyre to the wheel. The weight of the bridge and the force of friction caused by the rotation in a circle would prevent the tyre from going back on and staying on for any length of time. Mr Price would have known that.

(j) Mr Price was found trapped in an area between the middle and upper railings of the guard-rail. There was an area between the bottom and middle railing which was capable of fitting a whole body through. If Mr Price had been trying to affect a temporary repair to the drive wheel by hammering the tyre back on, he would arguably have been in closer proximity to the drive wheel if he had leaned his body through at the lower point.

(k) There was no pressure for Mr Price to carry out any kind of dangerous repair. The Whitburn Site was not operating at capacity. The tank in question could have been taken out of operation if necessary. The Work Order, albeit classified as Priority 3, allowed 72 hours for it to be completed. A replacement drive wheel and bonded tyre would require to be ordered in any event as they were not kept on site. Mr Price would have been aware of all of these factors.

[102] The suggestion that Mr Price was attempting a repair without isolating the moving bridge was not credible, and the court should have regard to the factors weighing against that conclusion. It might be that the court was unable to reach a concluded view on the mechanism of how Mr Price came to be trapped where he was found. However Mr Price came to be there, it could be inferred that it was accidental rather than as a result of taking an out of character deliberate risk.

[103] Addressing the question of how it was physically possible for Mr Price's body to become trapped in the way that he was found, counsel reminded me that the horizontal rails of the perimeter guard-rail around the tank were located at 1.1m, 0.66m and 0.165m above ground level. Both the horizontal rails and vertical stanchions were made from steel tube 40mm in diameter. There was an area between the lower to middle railings and the middle to upper railings of the perimeter guard-rail sufficient to permit a person to fit through. There was no fencing or guards preventing access through the railings. The access bridge was self-operating and rotated anti-clockwise around the tank. The radial gap between the vertical stanchion of the perimeter guard-rail and the bridge guard-rail was only 80mm. The gap between the mid perimeter rail and the curve of the bridge guard-rail was only 166mm. This presented a crushing hazard between the end of the rotating bridge guard-rail and the perimeter railing if a body, or any part of a body, apart from a finger, were to protrude through the perimeter guard-rail at a point when the self-operating rotating bridge passed by on its rotation.

[104] Mr Price was fatally crushed between the mid-rail and stanchion of the perimeter guard-rail and the guard-rail of the rotating access bridge at Final Settlement Tank No. 2

(West). From his position he would have been unable to access the emergency e-stop button or the stop button on the bridge guard rail.

[105] Counsel took me through the applicable legislation and regulations and how, in her submission, these applied to Veolia in the context of this case.

[106] The Health and Safety at Work Act 1974 imposes a duty on employers to provide their employees with a safe system of work, a safe place of work and safe equipment, plant and machinery. They have a duty to carry out risk assessments as set out in the regulations, and take steps to eliminate or control those risks. They have a duty to inform their employees fully about all potential hazards associated with any work process or activity, including providing instruction, training and supervision.

[107] Under Regulation 3 of the Management of Health and Safety at Work Regulations 1999 (“the 1999 Regulations”) there is a duty on an employer to make a suitable and sufficient assessment of the risks to the health and safety of their employees to which they are exposed whilst they are at work, for the purpose of identifying the measures they need to take to comply with the requirements and prohibitions imposed upon them by or under the relevant statutory provisions. There is also a duty under the 1999 Regulations to record the significant findings of such a risk assessment.

[108] The minimum that an employer must do under the terms of the 1999 Regulations is: (i) identify what could cause injury or illness in their workplace (hazards); (ii) decide how likely it is that someone could be harmed and how seriously (the risk); and (iii) take action to eliminate the hazard; or if this isn’t possible, control the risk.

[109] PUWER applies to all workplaces and work situations where the 1974 Act applies. Under Regulation 2, “work equipment” means any machinery, appliance, apparatus, tool or installation for use at work. Employers have a duty under Regulation 3 to ensure that items of work equipment comply with PUWER.

[110] Under Regulation 11 of PUWER, employers are required to take effective measures to prevent access to any “dangerous part” of machinery, or to stop the movement of any dangerous part of machinery before any part of a person enters a “danger zone”. These measures should be applied following an established hierarchy which is listed in the HSE Approved Code of Practice (ACOP) L22 (Crown Production Number 77) which accompanies PUWER.

[111] The hierarchy consists of the provision of the following: (a) fixed guards enclosing every dangerous part ... where practicable to do so; or (b) other guards or protection devices where practicable to do so; or (c) jigs, holders, push-sticks or similar protection appliances used in conjunction with the machinery where practicable to do so; and (d) information, instruction, training and supervision as is necessary.

[112] “Dangerous part” has been established to mean that if a piece of work equipment could cause injury while being used in a foreseeable way, it can be considered a dangerous part. Regulation 11(1) imposes an absolute statutory duty on an employer, and if the work equipment is considered a dangerous part, the hierarchy of measures applies. It has been held that statutory provisions of this kind are intended to protect employees against, inter alia, accidents caused by inattention or inadvertence. The protection does not extend only to employees who are fully alert. A momentary lapse

on the part of the employee falls short of being described as a lack of reasonable care on the part of that employee; (*McGowan v W & JR Watson Ltd* 2007 S.C. 272 at para 14).

[113] “Dangerous machinery” is machinery that, in ordinary use, danger might be reasonably anticipated not only from a prudent, alert and skilled operative but also a careless and inattentive operative.

[114] The “danger zone” is the area on or around machinery in which there is a risk of contact between a person and a machine. The term “practicable” is distinguishable from “reasonably practicable” or “foreseeable”. In order to be practicable, the safety measures must be possible to fit, and should not increase any health and safety risks. In deciding what is practicable, some degree of reasoning must be applied; as well as consideration of the foreseeable risks from the absence of any safeguarding measures.

[115] Workplace risk assessments carried out under the 1999 Regulations should identify hazards presented by machinery. The risk assessment should evaluate the nature of the injury, and the severity and likelihood of occurrence for each hazard identified. In most cases the objective of risk reduction measures is to prevent contact of part of the body or clothing with any dangerous part of the machine, for example guarding.

[116] Table 1 of BS EN 349 “Safety of Machinery – Minimum gaps to avoid crushing of parts of the human body” provides minimum gaps between fixed and moving machinery in order to prevent crushing. The minimum gaps between the guard-rail of the bridge and the perimeter rail of the tank were 166mm at the mid rail and 80mm at the stanchion. As such, the movement of the bridge past the fixed horizontal perimeter

rails and vertical stanchions presented a risk of crushing to the whole body, head, leg, foot, arm, hand, wrist and fist.

[117] The risk of crushing was not identified as a hazard in the risk assessment for the Final Tank maintenance. Consequently, no control measures were identified in order to reduce the likelihood of injury.

[118] Counsel took issue with Mr Gostick's evidence that a safe system of work might be an adequate control measure. In any event, the safe system of work was not adequate at Whitburn.

[119] There was a sign in place at the time of the accident on Final Settlement Tank No. 1 (West) which read: "Danger Deep Water and moving machinery". There was no warning on Final Settlement Tank No. 2, where this accident occurred. Neither was there any warning of any crushing hazard. The risk assessment for 'Final Tank Maintenance' that Mr Price had to read and sign prior to carrying out any work on the Final Settlement Tanks did not identify the hazard of crushing posed by the rotating bridge and guard-rail and the perimeter guard-rail.

[120] Further, in order to stop the rotating bridge using the e-stop or the stop button on the bridge guard-rail, any operative had to first enter the danger zone and be within a reasonably close proximity to the perimeter guard-rail to reach over and access the controls. There is no evidence that such a hazard was ever identified by Veolia or that any control measures were considered. In counsel's submission, this was a lower standard of safeguarding than was reasonably practical.

[121] Since the accident, new signs have been erected at the site which read “Danger Deep Water - Do not lean over or through the handrails” and “Danger Moving Machinery - Isolate before access and maintenance”. However, the risk assessment has not been updated to include any reference to a hazard from crushing.

[122] Although training, experience and ability could affect risk assessment, they were not a substitute for hazard elimination or reduction through design or physical guarding where practicable. Guarding was reasonably practicable. The evidence of Mr Gostick and Mr Johnston in that regard, and in relation to his interpretation of the European Standards should be preferred to that of Mr Flanagan.

[123] Although the bridge sensor and alarm system was in operation on Final Settlement Tank No. 2 (West) on the day of the accident, this did not provide any realistic warning or safety feature in circumstances where someone became trapped between the fixed perimeter guard-rail and the bridge guard-rail.

[124] In concluding her written submissions on behalf of the family, counsel invited the court to make findings under section 26(2) (e) (precautions which could have been taken), (f) (defects in any system of working) and 26(4) (recommendations). The points were helpfully listed under each particular statutory subsection. A number of the findings argued for fell within the ambit of more than one subsection, leading to a degree of overlap or repetition. However the relevant points can be grouped together and summarised as Veolia requiring to:

- (a) comply with the statutory duties incumbent on them in terms of the Health and Safety at Work Act 1974, PUWER and the Management of Health and Safety at Work Regulations 1999;
- (b) provide their employees with a safe system of work;
- (c) carry out a suitable and sufficient risk assessment under Regulation 3 of the 1999 Regulations to acknowledge and include:
 - i. the potential for crushing between the rotating bridge guard-rail and the fixed perimeter guard-rail, having regard to the minimum gaps involved,
 - ii. the risk due to the high power and torque of the bridge and slow moving speed,
 - iii. the need for guarding to prevent access to the crush risks from dangerous parts of the machinery;
- (d) update their assessment accordingly;
- (e) identify the appropriate control measures necessary to eliminate or control the risks following the hierarchy outlined in PUWER, and include those in the updated risk assessment:
 - i. Fitting effective measures to prevent access to dangerous parts by physical guarding such as moveable interlocking outer ends for the access bridge guard-rails, infilling the gaps in the outer perimeter guardrail and gate to eliminate all gaps in excess of 40mm and fitting pressure sensitive

edges to the bridge guard rails to stop the bridge motion automatically on detecting an obstacle;

- ii. Re-siting the stop and e-stop controls so that an operative does not have to lean over the railings to activate the controls;
- iii. Placing warning signs at the Final Settlement Tanks warning of the risk of crushing injury.

Submissions on behalf of Veolia

[125] Although there was no direct eye witness evidence of the precise circumstances in which the accident occurred there was compelling circumstantial evidence that Mr Price was leaning through the handrail of the perimeter tank, attempting to undertake a temporary repair of the drive wheel, having failed to isolate before doing so, in consequence of which he became trapped between the stanchion of the handrail and the rotating bridge, and sustained fatal injuries.

[126] Mr Keast spoke to the discovery of a lump hammer in the channel of the settlement tank immediately below the motor of the drive wheel and the position at which Mr Price had been found. The bridge could not have rotated past the hammer. The only reasonable inference which may be drawn is that the hammer had been dropped at the point of, or immediately before, Mr Price becoming trapped.

[127] It was reasonable to infer also that the hammer found in the channel on 1 February 2018 belonged to Mr Price. Witnesses looked for his hammer after the accident but could not find it at that time.

[128] Subsequent examination of the hammer head, drive wheel and motor showed a correlation between damage and paint marks between these items. Mr Gostick concluded that it was possible that Mr Price had been attempting to effect a temporary repair to the wheel by "... trying to hit tyre to persuade it to move back on ...". In his evidence Mr Pugh described the difficulties which Mr Price would have faced in undertaking such a repair whilst leaning through the handrails, and described the swinging actions which Mr Price may have been undertaking which could have resulted in accidental contact between the hammer head and the motor. Having regard to all the circumstances it was reasonable to conclude that the marks noted on the hammer head, wheel and motor were likely to have been occasioned in the course of a temporary repair undertaken by Mr Price.

[129] Mr Johnston's competing theory was that the marks on the wheel would have been caused as the tyre came off, allowing the wheel to come into contact with the concrete base. That was mere speculation and was contradicted by the clear and unchallenged evidence of Mr Pugh that this could not happen. Mr Johnston's theory should be rejected.

[130] Mr Gostick suggested that by having the motor continue to run and the wheel continue to turn, albeit intermittently, that may have been perceived to have assisted the process of attempting to get the tyre back on. That provided a very reasonable explanation as to why Mr Price departed from the fundamental rule, with which he was so familiar, to always isolate from the power supply before undertaking any form of maintenance work involving moving parts.

[131] The suggestion advanced on behalf of the family that the accident may have occurred as a result of Mr Price tripping whilst undertaking a visual inspection of the drive wheel was inherently improbable. It did not address the circumstantial evidence suggesting otherwise. The evidence showed that it would not be necessary to approach the handrail to carry out such an inspection. Had he slipped or tripped, it is likely that he would have been able to grab one of the horizontal handrails to arrest a fall into the position he was found in. HSE Inspectors who examined the locus thought that Mr Price's position was inconsistent with a trip, and in any event, they did not note any particular trip hazards on the ground.

[132] In relation to section 26(2) (e) of the Act, it was submitted that there were no "reasonable precautions" which could have been taken by Veolia which might have prevented the accident. The meaning of "reasonable precaution" was considered by Sheriff Kearney in the Fatal Accident Inquiry into the death of James McAlpine (October 1985). That Inquiry was held under the 1976 Act, but the same considerations would apply to an Inquiry under the current legislation. He observed that:

"In relation to making a finding as to the reasonable precautions, if any, whereby the death and any accident resulting in the death might have been avoided it is clearly not necessary for the court to be satisfied that the proposed precaution would in fact have avoided the accident or the death, only that it might have done; but the court must, as well as being satisfied that the precaution might have prevented the accident or death, be satisfied that the precaution was a reasonable one".

[133] If the Court were to conclude that the accident occurred as a result of a trip, it was not disputed by Mr Gostick that the guardrails in place were appropriate to prevent falls from height (which could include accidental falls as a result of tripping). These met

the requirements of Part 10 of BS EN 12255, and also of Schedule 2 of the Work at Height Regulations 2005. Beyond those precautions which they did in fact take, there were thus no reasonable precautions which Veolia might have taken which might realistically have prevented the accident.

[134] If the Court were to find, on the balance of probabilities, that the accident occurred while Mr Price was undertaking a temporary repair, there was clear evidence about the system of work which was in place when undertaking any form of maintenance. He was well aware of that; having been provided with appropriate information, instruction and training along with everyone else on site.

[135] Mr Buchanan was asked if he was “ever required to work on moving pieces of machinery”, and if there was a process to do that. He replied without qualification: “isolate – switch off and isolate with a padlock”. He confirmed that when working near anything that moves, there are any number of potential hazards. His training was therefore always to isolate first if working near any moving part.

[136] Darren Hughes, mechanical technician, gave evidence in similar terms. When asked about his awareness of risks at the settlement tank his answer was general, namely “entrapment, slip and trips and falls, drowning” for which the control measure was always to isolate. When asked in cross-examination as to whether, prior to the accident, he had been aware of the risk of being crushed between the stanchion on the guardrail and the bridge his position was unequivocal, (“... you shouldn’t be leaning through the handrails when the bridge is moving ... should be isolated”). He

acknowledged that the risk assessment did not make specific reference to this particular way in which a trapping/crushing hazard may arise.

[137] In senior counsel's submission, the evidence led in the Inquiry demonstrates that such a level of detail setting out every conceivable way in which a crushing hazard may arise would have been both unnecessary and, in any event, inconsistent with HSE Guidance. In cross-examination, Mr Hughes said of the requirement to isolate whenever working on moving parts "... at Veolia it is drummed into you during your apprenticeship". It was clear from the evidence that the importance of isolation continued to be re-enforced thereafter by training and monitoring.

[138] Ewan Bryce, maintenance technician, gave evidence as to maintenance procedures. In evidence in chief he stated that "... there is no maintenance task which would be carried out with the bridge moving" and in cross-examination by Ms Forbes he agreed that the isolation of machinery was "... a key thing to do before starting any repairs".

[139] Kyle Taylor started his apprenticeship with Veolia in 2016 and was effectively trained by Mr Price. He had worked with Mr Price on a final settlement tank both at Whitburn and East Calder. His evidence was unequivocal as to the steps to be taken when undertaking maintenance on a settlement tank. He identified the risks as "... if not isolated, entrapment/falling into the tank...".

[140] In senior counsel's submission, there was clearly an effective safe system of work in place for when operatives undertook maintenance involving any moving parts. Irrespective of the precise manner in which the hazard of trapping or crushing might

arise, that control measure was very simple; namely to isolate. HSE witnesses also accepted that the system of work was clearly understood and applied by all witnesses.

[141] Mr Price was a competent and experienced employee. He had received appropriate training in relation to the control measure of isolation and when it must be applied. His training certificates are agreed at paragraphs 25, 26, 27, 28 and 33 of the Joint Minute of Admissions and were spoken to in detail in evidence by Ian Alton, maintenance delivery manager. This was reinforced by systems to monitor the working standards of employees, including Mr Price, by the use of worksafe observations. The most recent of these had been conducted in relation to Mr Price just 6 days before the accident, and no issues of concern had arisen.

[142] In relation to this issue, the evidence of Mr Gostick is important. He was of the view that control of the hazard by the introduction of safe systems of work as opposed to fixed or interlocking guards may be appropriate.

[143] There was no basis upon which it could properly be argued that the system of work which was in place was not safe, both in theory and practice. The Court heard that Veolia was doing nothing different from the operators of similar waste water treatment plants throughout the UK; all of whom have employed such a control measure without adverse comment by the Safety Regulator.

[144] A reasonable precaution which could have been taken by Mr Price prior to attempting any temporary repair would have been to isolate the equipment. Had he done so, this tragic accident would not have occurred.

[145] In relation to section 26(2) (e) of the Act, senior counsel addressed the Standards applicable to settlement tanks. In his submission, HSE accepted that the risk to which Mr Price was exposed could be appropriately addressed by the implementation of a safe system of work (whether BS EN 12255 applied or not), so the determination of this particular issue may be considered, ultimately, to be of limited significance.

[146] BS EN 12255 (including parts 1 and 10) is the Standard that applies to the final settlement tank. Part 1 specifies general requirements for the construction of structures and equipment as they relate to wastewater treatment plants. “Equipment” is defined as “any component which is installed in, mounted on, attached to, or operated on structures, in the performance of their intended function”.

[147] Annex B of BS EN 12255 (Part 1) makes specific reference to the type of final settlement tank found at Whitburn, namely a “circular tank with a scraper bridge travelling on the side wall (track)”.

[148] BS EN 12255 has the status of a British Standard. Part 1 provides that the safety requirements of plant and equipment to be constructed is provided by Part 10. The general hazard of potential trapping presented by moving parts is well recognised. Section 4 of Part 10 of BS EN 12255 sets out the safety requirements, and makes no mention of trapping hazards.

[149] It was not surprising that Mr Flanagan reached the conclusion that BS EN 12255 applied not only to the settlement tank at Whitburn but also to the rotating bridge mounted on it. It was Mr Flanagan’s opinion that, in the absence of there being any safety requirement in section 4 of Part 10 for the provision of guarding of moving parts

on the rotating bridge, it could clearly be inferred that that such a control measure was not considered necessary by the authors of the Standard. That being the case, it was entirely appropriate and reasonable for duty holders such as Veolia to address any residual risk by the application of a safe system of work.

[150] Mr Gostick's opinion was that Part 10 of BS EN 12255 did not apply to the rotating bridge and its moving parts, and it would be necessary to consult other regulations in order to determine whether guarding of that machinery was necessary.

He referred to section 1 of Part 10, which states:

“Special safety requirements e.g. in the fields of electrical and mechanical engineering which are dealt with in other regulations, shall be observed although they are not mentioned specifically in this standard”.

[151] Senior counsel took issue with the weight to be attached to Mr Gostick's interpretation. Mr Gostick was a specialist inspector qualified in mechanical engineering; but he did not have any expertise in the interpretation of Standards. He had some knowledge of European Standards since joining the HSE in 2012. He had been appointed to two BSI Standards Committees and a CEN committee, but in cross-examination he stated that he rarely required to have regard to Standards in his previous career. He was not a member of the Standards Committee dealing with wastewater treatment plants, and accepted in evidence that he has no expertise or experience in relation to wastewater treatment plants. Mr Gostick's opinion on this point did not appear to be based on any independent evidence, or previous experience of the interpretation of similar provisions. Moreover, it was wholly at odds with the clear definitions provided of plant and equipment summarised at paragraph 21. That

interpretation, if correct, would also be wholly inconsistent with the approach to safety requirements seen in the remainder of section 4 of Part 10.

[152] It was also important to consider the meaning of the term “special” in the context of safety requirements. Mr Flanagan’s evidence was that trapping caused by moving parts of machinery is a generally well-known hazard. It could not be described in any way as a “special” safety requirement in the context of wastewater treatment plants.

[153] Senior counsel invited the Court to prefer the evidence of Mr Flanagan in this regard to that of Mr Gostick, given his area of expertise, relevant qualifications and experience. Mr Flanagan had extensive practical experience of a general nature in the interpretation and enforcement of health and safety legislation derived from his 23 years in the HSE, 11 of which were as a Principal Inspector. He also had specific roles which are of particular relevance to the issues being considered in this Inquiry. As Head of the Product Supply Enforcement Team in the Midlands an integral part of his function was to assess, interpret and apply relevant standards. He had particular knowledge and expertise in relation to the fairground industry and his very detailed understanding of the hazards presented by moving parts and the control measures which may be applicable.

[154] Mr Gostick was critical of the Veolia risk assessment on the basis that, although it identified in general terms the risks of “drawing-in/entanglement/crushing of hands, and arms, feet and legs by rotating wheels, gear trains”, it failed to specifically identify the hazard of crushing between fixed and moving guard-rails. That criticism is

fundamentally flawed, and in any event the absence of specific reference to the hazard had no causal connection with the accident.

[155] Senior counsel commended to the court Mr Flanagan's evidence that the purpose of a risk assessment is to identify sensible measures which require to be taken to comply with the duties owed under health and safety legislation to control the risks in the workplace. It was not about creating huge amounts of paperwork. There was no merit in Mr Gostick's criticism where such a potential hazard had not been known to have resulted in any accident since this design of tank came into use more than 40 years ago. There was an effective system of work in place. That system was isolation of the machinery when engaging in any form of maintenance involving moving parts. The evidence was it was clearly understood, and expected to be applied by all witnesses.

[156] Mr Gostick also criticised the siting of the e-stop switch. However, the evidence of all witnesses who required to operate that switch was that they had no difficulty in reaching it. More significantly, it was accepted by Mr Gostick that, even if the e-stop switch had been in a different position (e.g. on the outside of the bridge), it would not have prevented the death of Mr Price.

[157] In relation to the bridge sensor, this had been initially set to activate after 15 minutes. At the time of the accident, the sensor setting had been altered to alert after one hour of not detecting movement. The question was raised as to whether the changing of time-setting may have contributed to Mr Price's death not being prevented.

[158] Despite Mr Johnston's evidence that the sensor would have had a safety-related function, the unchallenged evidence of Mr Pugh was that the sensor was used by Veolia

for operational purposes only. It was not relied upon as a safety feature in any way. This was demonstrable by the fact that it did not stop the power; it merely created an alert that rotation was not occurring. Further, the alarm went through to the Seafield site some distance away. Whether set to activate after an hour or quarter of an hour, the activation of the sensor would not prevent a crushing injury, and would not have prevented the death of Mr Price.

[159] Senior counsel did not invite me to make any findings critical of Veolia under section 26(2)(e), (f) or (g).

Discussion and Conclusions

[160] I found all the witnesses to the Inquiry to be credible and reliable. There was little, if any, dispute about the facts spoken to in evidence. The controversy was rather about the inferences which could be drawn from those facts, and expert opinion evidence as to whether Veolia had complied with their duties in relation to assessment of risks and safety of machinery; and whether there were reasonable precautions which might have avoided the accident.

How did Mr Price come to be in the position which he was found?

[161] There were no eye witnesses to the accident, and no CCTV footage. The competing theories were that Mr Price must have slipped, tripped or fallen while carrying out an inspection; or that he had been attempting to effect a temporary repair to the tyre on the drive wheel without isolating the rotating bridge from the power supply

to prevent it moving. The arguments for and against each possibility were fully canvassed in the parties' submissions summarised above.

[162] Counsel for the family reminded me of Mr Johnston's evidence that he would not have expected someone of Mr Price's experience and knowledge to attempt to hammer the tyre back on to the drive wheel without isolating the power, and that this approach would have in any event been ineffective. As to the former point, there is no dispute that Mr Price was very experienced, well trained and safety conscious. However, experience shows that human fallibility can lead to overconfidence, a loss of focus or a lapse. Sometimes, entirely out of character, people will be prepared to deliberately court a risk they would not normally countenance for inexplicable reasons or misplaced but well intentioned motives; such as in the interests of making-do and getting the job done. As to the second point, I accept that the evidence was that trying to hammer the tyre back on as a temporary repair was not as effective as replacing the wheel. However, Mr Pugh and Mr Gostick concluded that it was possible Mr Price had been attempting to effect a temporary repair to the wheel by trying to hit the tyre to persuade it to move back on. Mr Pugh's evidence was that it was possible to do this, and keeping the rotating bridge moving would make it easier to thread the tyre back on albeit on a temporary basis.

[163] The evidence about the finding of the lump hammer in the channel the day after the accident was in my view significant and telling. The competing interpretations of, and weight to be given to, the finding of the hammer are set out in the submissions summarised above. The evidence about the finding of the hammer, and corresponding

damage on the wheel and hammer, was significant circumstantial evidence which, taken along with all the other evidence, gives rise to a reasonable inference about what Mr Price had been doing when he met with this tragic accident.

[164] I am unable to agree with counsel that the evidence concerning the hammer amounted to no more than speculation. Mr Price was found leaning through the handrail of the perimeter fence round the tank shortly after being tasked to, and agreeing to, investigate the damage. He was bent forwards facing into the tank in a kneeling position. The following day, a lump hammer was discovered in the channel of the tank directly below where Mr Price was found and also directly below the motor of the drive wheel with the damaged tyre. It was a hammer of a type he was known to use and was part of his standard toolkit. Following the accident, his hammer was missing and could not be accounted for. It was not found despite a search in his van. It seems reasonable to conclude that the hammer discovered in the tank on 1 February 2018 was Mr Price's hammer and that it fell into the tank at the time of his accident.

[165] The hammer was found between the drag chain and brushes at the bottom of the tank. This meant that the bridge had not rotated past the hammer because otherwise the hammer would have been caught by the brushes and swept on round to the tank outlet. This supports the conclusion that the hammer had been dropped at the point in time when, or immediately before, Mr Price became trapped.

[166] Examination of the hammer and comparison of damage marks on them was carried out by Veolia. Although this was not carried out with the use of precision equipment or specialist expertise, skilled engineering and HSE witnesses noted impact

marks on the hammer head which appeared to be fresh and relatively recent. Paint marks on the hammer head were of a similar colour to the paint on the drive unit. I was able to place reliance on this evidence. It seems to me that the hammering on of a derailed and damaged tyre back onto a moving wheel is not an exact science, and there is scope for a person leaning through the guardrails to inflict damage in a random way in the course of doing this.

[167] Mr Pugh was familiar with the operation of the bridge and confirmed that the damage to the wheel not could have been caused by the wheel coming into contact with the concrete perimeter without the cushioning effect of the tyre. His evidence was that the wheel is attached to a fixed unit, so that it is supported above the ground and cannot drop down to the concrete in the event of the tyre becoming detached. I prefer Mr Pugh's evidence to that of Mr Johnston on this point.

[168] For these reasons, I am persuaded that the hammer belonged to Mr Price, and the location of its finding and corresponding marks on the hammer head and the motor are significant evidence supporting the conclusion that the bridge was still turning when he became trapped. In the absence of any evidence that he had fallen, tripped or slipped, or suffered a sudden illness causing collapse from natural causes, the most likely explanation, in my view, is that he had been working at the moving wheel when he became trapped.

Veolia Safety Practices, Guidance and Training

[169] I was satisfied on the evidence that Veolia is a safety conscious site operator and employer. The culture of safety is supported by a well-developed, well understood and regularly reinforced system of formal and informal safety training. Veolia provides training and instruction to their maintenance employees to allow them to carry out their maintenance roles safely. All maintenance staff considered the training they received to be comprehensive and there was no concern that this was lacking in any respect.

[170] The training provided includes a mix of external and internal courses which are recorded and certificated as appropriate. Veolia also conduct regular “Toolbox talks”. These provide an informal opportunity for employees to refresh safety awareness, update information and instruction, and share experience of concerns between employees themselves and with management. All employees have “Empowerment cards” encouraging them to challenge and promote safety, and to “stop the job” if they feel unsafe. This is supported by “worksafe” observations, which are an internal process for management to view and engage with employees while they are carrying out their day to day activities so that they can verify and promote a “think safe” approach.

[171] The latest worksafe observation of Mr Price was undertaken on 25 January 2018 while he was working with another colleague. On that occasion, Campbell MacColl, maintenance supervisor, oversaw him changing wheels on a sand filter at East Calder. No unsafe working conditions or practices were noted.

[172] Another important element of the safety regime within Veolia is the risk assessment process. There are Risk Assessments in place for various activities at the

Plant, including in relation to the Final Settlement Tank. These assessments are recorded in writing and the documents are kept in the office. Employees confirm that they were aware of these and would consult them - both to remind themselves of risks and check if there had been any changes to the assessment or advice.

[173] A risk assessment for the final settlement tanks at the Whitburn site was produced in 2015. It was reviewed, prior to the accident, in 2016 and 2017. This referred to the risk of "Drawing-in/Entanglement/Crushing-of hands and arms, feet and legs by rotating wheels, gear trains". The controls for reducing this risk include the requirement that "when working on bridge drive and structure local isolation is in place ensuring bridge is unable to start".

[174] The risk assessment does not specifically mention as a hazard the trapping point between the rotating bridge and the fixed perimeter fencing around the tank. Isolation procedure is referred to in a separate guidance document: Veolia "Final Tank Maintenance". HSE has noted that the risk assessment could be clearer on these points and served an Improvement Notice on Veolia to update it in light of the accident involving Mr Price. The Improvement Notice is subject of an appeal by Veolia.

[175] However, all maintenance employees who gave evidence were well aware of the risks and controls in place. They all understood that the risk of crushing between the moving bridge and the fixed perimeter fencing was a known risk, even without it being specifically identified in the risk assessment. No witness identified a task which required an operative to lean through the perimeter fence. There was no maintenance activity that would be undertaken on the final settlement tank with the moving bridge

still rotating. The systems of work which maintenance employees are instructed to follow are outlined in different written guides, such as the isolation and permit to work guidance. The isolation procedure guidance outlines the procedure that employees are expected to follow when working on work equipment (Crown Production Number 23 at para 5.9).

[176] All maintenance employees who gave evidence spoke to the same process when approaching a maintenance task such as replacing the drive wheel of a final settlement tank. The systems of work included a check of the risk assessment prior to working on plant. They confirmed that first step would always be to isolate the plant using the stop switch or e-stop switch and padlock the switch in the off position. Mr Price signed the risk assessment on the morning of the incident, confirming he had familiarised himself with it. This referred to isolation when working on the bridge by way of “ensuring bridge is unable to start”.

[177] There was consensus among the witnesses that the requirement to isolate the plant before working on it was a basic rule which everyone was taught to apply in working with machinery, and it was not limited to work on final settlement tanks in the waste water industry. It is well understood that there are any number of hazards to be considered when working with anything which moves.

Mr Price: Background, Experience, Training and Safety Awareness

[178] Mr Price was an experienced and conscientious employee. All the Veolia witnesses spoke highly of him as a colleague, and it is clear that he was trusted and

respected. That extended to his knowledge of, and observance of, safety procedures including isolation procedure. Witnesses did not think he was a risk taker and were surprised by the suggestion that he might have been trying to change the drive wheel tyre without isolating the bridge to prevent it moving. He was a union representative and safety representative on site. By all accounts, he took safety seriously and would be entrusted from time to time to train apprentices in work and safety practices.

[179] He had undertaken various training courses as documented in Appendix B to the Preliminary Investigations Report (Veolia Production Number 2). The training included Veolia risk assessment and Permit to Work procedure, and mechanical isolation training including the use of padlocks. Isolation training was provided by MET in 2011 and the Pearson Academy of Vocational training in 2014. He also participated in Personal Development Plans (PDP's) and "Talk Listen and Act" (TLA) activities aimed at reviewing and examining his training and competency. His training record is set out in detail at paragraphs 25-28 and 33 of the Joint Minute, and spoken to in the evidence of Ian Alton. There was no suggestion that his training was in any way inadequate for the job he appears to be have been carrying out at the time of the accident.

[180] In relation to the specific task of working on the final settlement tank at Whitburn, records of work orders showed that he done had the following jobs previously:

- a. In 2014 he was tasked to investigate and repair a bearing on the drive wheel on Final Settlement Tank No. 1.

- b. In 2016, he repaired the trailing wheel and overhauled the wheel gearbox on Final Settlement Tank No. 2. He also replaced and removed the tyre.
- c. In 2017 he attended Final Settlement Tank No. 1 where the tyre was reported as coming off the drive wheel. He stripped off the damaged wheel and tyre, modified the new tyre assembly to fit the wheel then refitted the wheel assembly.

Was there an adequate Risk Assessment and Safe System of Work in place?

[181] The risk assessment for the final settlement tanks at the Whitburn site was issued in 2015. It was reviewed, prior to the accident, in 2016 and 2017. As noted, this identified the hazards as being “Drawing-in/Entanglement/Crushing of hands and arms, feet and legs by rotating wheels and gear trains”. It provides that the control for the hazards includes “when working on the bridge drive and structure, local isolation is in place ensuring bridge is unable to start”.

[182] It does not mention the existence of a trapping point between the rotating bridge and the fixed perimeter fence around the tank. Nor is it specified how isolation is to be carried out, as this is detailed in a separate Veolia document dealing with final tank maintenance. I note that an Improvement Notice issued by HSE has been appealed by Veolia.

[183] I have to agree with the Crown and Senior Counsel that the written risk assessment does not reflect the full extent of the controls which are in fact in place. All employees who gave evidence were aware of the importance of isolating the moving

bridge before attempting work on it and the risk of harm if this was not done.

Independently of Veolia's risk assessment, the operatives requiring to work at the bridge were all adamant that it is drummed into people working with machinery from the outset that you must isolate any moving plant before working on it. None of the witnesses were in any doubt of the need to isolate and how to do it. They were familiar with the switches and their location, including those on the bridge and those in the nearby building. They had personal padlocks to physically lock off the switches, in addition to site padlocks, and they knew what these were for. No witness indicated that they would attempt to work on the bridge without isolating. No maintenance employees could in fact call to mind any maintenance activity that would require to be carried out either while the bridge was rotating or by leaning through the perimeter fence. Mr Price was well aware of the risks. He had undertaken a wheel replacement before and had signed the risk assessment that morning, shortly before the accident.

[184] I do not therefore consider that the risk assessment can be said to be inadequate given the primary control identified, and which, if it had been followed, the accident could not have occurred. Even if it could have been expressed more clearly or comprehensively, I agree with the Crown that cannot be considered a causative factor in Mr Price's accident. HSE's guidance refers to "identifying sensible measures to control the risks in your workplace". This is different from requiring an employer to list in writing, and provide additional safeguards against, every conceivable hazard, however remote, which might arise from a failure to follow the clear, universally understood and effective control measure in place.

[185] Having regard to the factors referred to above, and the fact that no accident of this kind is known to have occurred in the period of nearly 50 years since the tanks were commissioned at Whitburn in 1972, and at other sites around the country, I am of the opinion that the criticisms of Veolia's safe system of work are not well founded. I am satisfied that they were adequate and that Veolia have complied with the obligations upon them in that regard.

Were there reasonable precautions which could have been taken by Veolia to avoid the accident?

[186] In relation to the question of whether there was an obligation on Veolia to provide guarding around moving parts of the bridge, there was no dispute that the Standard applying to the final settlement tank is BS EN 12255. That Standard makes no mention of trapping hazards. The parties' arguments are summarised in their submissions above. Counsel for the family submitted that it could not be assumed that an employer had complied with all their duties in relation to safeguarding of machinery just because there was no specific provision of BS EN 12255 that had been breached. Employers were still required to observe all the other safety regulations and standards applying. In making the case for guarding, counsel relied principally on Mr Gostick's evidence that Part 10 of BS EN 122555 was not the last word in relation to safety of the rotating bridge and its moving parts because section 1 of Part 10 states that:

"Special safety requirements, e.g. in the fields of electrical and mechanical engineering which are dealt with in other regulations, shall be observed although they are not mentioned specifically in this standard".

[187] However, it is clear from Part 1 of the Standard that it is intended to specify the general requirements for the construction of waste water treatment plants and the structures and equipment associated with them. According to paragraph 3.2 of Part 1, it covers, “any component which is installed in, mounted on, attached to, or operated on structures, in the performance of their ordinary function”. As a matter of interpretation, it therefore seems clear that the moving bridge would be covered by that definition.

[188] Mr Flanagan’s analysis was that the Standard was the definitive safety guideline, and in the absence of any safety requirement in section 4 of Part 10 for the provision of guarding around moving parts of the tank, it could be taken that the authors of the Standard had determined that such a control measure was not necessary to address any hazard presented by these parts. It seems to me that there is weight in this submission. The specialist experts involved in putting together the Standard would be best placed from their knowledge to specify the appropriate control measures to deal with hazards presented by that particular machinery. The requirement to observe safety requirements contained in other regulations, even if not mentioned in the Standard, refers specifically to “special safety requirements e.g. in the fields of electrical and mechanical engineering”. In my opinion, it is correct to say that the hazard of trapping caused by moving parts is a well-known hazard, and it cannot be described in any way as “special” in the context of waste water treatment plants.

[189] For these reasons, I prefer Mr Flanagan’s analysis to that of Mr Gostick. I am not persuaded that it is appropriate to look beyond the four corners of the Standard

applying to the tank to see if there is a different requirement laid down elsewhere which could have been included in the Standard but wherein it is not mentioned, unless it is “special” in the sense of section 4.

[190] Veolia have the existing fence around the tank to prevent the risk of a person falling into the tank and drowning. That is the control measure for that hazard.

Isolation and training are the controls for the hazards of crushing and trapping. Veolia do not consider that it would be reasonably practicable to install fixed guarding in relation to the hazard of trapping/crushing.

[191] In considering the question of warnings, the photographs show a sign at Final Settlement Tank No. 1 warning: “Keep Out – Danger – Deep Water and Moving Machinery”. This sign was there at the time of the accident. Mr Pugh’s evidence was that anyone coming to Final Settlement Tank No. 2 from the site office (as Mr Price is assumed to have done) would have to pass that sign on the way.

[192] In relation to Mr Gostick’s criticisms of the position of the E-stop switch, the evidence of all the operatives who required to use it was that they had no difficulty reaching it. Indeed, Mr Gostick accepted that relocating the switch to the outside of the bridge would not have prevented the death of Mr Price.

[193] In relation to the bridge sensor and the alteration of its alarm interval, the evidence clearly established that Veolia regarded this wholly as an operational device to tell staff at the remote manned Seafeld site if the sweeping bridge was doing its job; and prompt them to investigate what maintenance would be required if it was not. It was not regarded as a safety feature. It is reasonable to suppose that had it had a safety

function, it would have been connected to the drive mechanism to shut it down if an obstruction was detected; or perhaps it would have sounded as an alarm locally at the Whitburn site rather than - or in addition to - at the remote Seafield site. For these reasons, I have come to the view that the set-up of the sensor in a different way would not have prevented Mr Price's death. I do not consider that there was any reasonable precaution in relation to the operation of the sensor which, if taken, might realistically have prevented the accident.

Conclusion

[194] The formal findings I am required to make in terms of the Act are set out at the beginning of this determination. I agree with the Crown that whether any changes or improvements in any area discussed in the course of the Inquiry should be made are matters for Veolia or others in that industry. Standing my findings as to how the accident occurred and the working practices and procedures employed by Veolia, I have not made any recommendations under section 26(1) (b).

[195] I am obliged to the Procurator Fiscal Depute and both counsel for their helpful presentation of the evidence and submissions; and to all the participants for the assistance which their involvement gave to the Inquiry.

[196] In closing this Determination, may I join the representatives of the parties at this Inquiry in expressing my condolences to the family of Mr Price for their sad loss as a result of this tragic accident. He was clearly a very highly regarded maintenance technician who was valued and respected by both his employers and his colleagues.