

SHERIFFDOM OF GLASGOW AND STRATHKELVIN AT GLASGOW

[2024] FAI 29

GLW-B904-23

DETERMINATION

BY

SHERIFF J F KERR

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

into the death of

DEREK McLEAN

GLASGOW, 16 July 2024

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 as ("the 2016 Act")):

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

Derek McLean was pronounced dead at 1522 hours on 22 August 2019 at the construction site at the St Enoch Centre, Glasgow.

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

Derek McLean had an accident in the course of his employment with Corecut Limited between 1445 hours and 1458 hours on 22 August 2019 in a stairwell known as both stair 35 or stair 2 at the east end of the St Enoch Centre, Glasgow, near to the Stockwell Street carpark.

(c) 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 Derek McLean was crush asphyxia from being trapped between a wall of the stairwell and a Brokk 260 machine.

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

The causes of the accident resulting in Derek McLean's death were him entering the risk zone of the Brokk 260 machine, and, operating the machine either deliberately or inadvertently.

(e) 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 the death, or any accident resulting in death, being avoided)

The accident and Derek McLean's death might realistically have been avoided if he had refrained from entering the risk zone of the Brokk 260 machine, and/or, de-energised the Brokk 260 by pressing the stop button on its remote control.

There were no other precautions which could reasonably have been taken which might realistically have resulted in the accident or death being avoided.

(f) 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 the death)

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

(g) In terms of section 26(2) (g) of the 2016 Act (any other factors which are relevant to the circumstances of the death)

There are no other facts beyond the findings set out in this Determination which are relevant to the circumstances of Derek McLean's death.

(h) In terms of section 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)

No recommendations are made.

NOTE:**Introduction**

[1] This was a mandatory Fatal Accident Inquiry in terms of section 2(3) of the 2016 Act as Mr McLean died as a result of an accident which occurred while he was acting in the course of his employment.

The Legal framework

[2] The purpose of the Inquiry is set out in section 1(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, criminal or civil. The Inquiry is an exercise in fact finding, not fault finding. The Inquiry is an inquisitorial process. In terms of section 26 of the 2016 Act the Inquiry must determine certain matters, namely: where and when the death occurred; when and where 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 had they been taken might realistically have resulted in the death or any accident resulting in the death being avoided; any defects in any system of working which contributed to the death, and any other relevant factors to the circumstances of the death. It is open to the sheriff to make recommendations in relation to matters set out in sub-section 4 of section 26 of the 2016 Act.

Proceedings and Parties

[3] A number of Preliminary Hearings took place and the Inquiry heard evidence on 22, and 23 and submissions on 26 April 2024.

[4] In the Inquiry the public interest was represented by Ms Gillespie, procurator fiscal depute. Mr Smith KC represented Core Cut Ltd. Mr Bowie KC represented Central Demolition Ltd. Mr Gray KC represented Sir Robert McAlpine Ltd, and, Mr Bergin, counsel, represented Mr and Mrs McLean, the parents of Derek McLean.

[5] The Inquiry was greatly assisted by parties agreeing much of the evidence. The agreed facts are repeated now in full as they set out a useful background and were crucial to the Determination reached. On occasions I have changed the wording slightly from what appeared in the Joint Minutes simply to assist the reader.

The first and main joint minute of agreement, agreed as follows

Antecedents

1. Derek McLean (Mr McLean) resided at [REDACTED]
2. Mr McLean was a diamond drilling operative and commenced his employment with Core Cut Ltd on 6 June 2011.
3. Core Cut Ltd were sub-contractors involved in a commercial refurbishment project which involved the strip out and reconfiguration of what was previously a British Home Stores retail unit at the St Enoch Centre in Glasgow ("the project").
4. The project involved substantial demolition work to remove internal concrete walls and floors and thereafter install a new steel and concrete structure within the

existing building. The purpose of these works was to enable the creation of a cinema, restaurant, and retail units.

5. The demolition aspect of the project was in two phases. Phase one involved the “soft strip” of the former retail unit. Phase two involved extensive demolition and removal of the structural concrete within the existing building, particularly on level 3.
6. The project started in August 2018 and was due for completion in May 2020. However, the Covid-19 pandemic significantly delayed the completion date.
7. The client for the project was Sovereign Centros Ltd. The principal contractor was Sir Robert McAlpine.
8. Central Demolition Ltd was appointed by Sir Robert McAlpine to carry out the demolition work. Central Demolition Ltd subsequently engaged Core Cut Ltd to assist with the demolition of the structural concrete because of their expertise and the equipment they had available to them.
9. Day to day supervision of Core Cut Ltd operatives was overseen by Central Demolition Ltd.
10. Core Cut Ltd are a specialist contractor who provide a range of services to industries including construction, nuclear, petrochemical and retail. These services include remote demolition, diamond drilling, sawing, nuclear decommissioning, passive fire protection, water and jetting and hydro demolition.
11. BROKK is a Swedish company who design and manufacture a range of robotic demolition machines used in a number of industries including construction and

demolition, metal processing and nuclear industry. There are a range of models from the BROKK 70 weighing approximately 570 kg, to the BLOKK 800 which weighs over 11 tonnes.

12. The machines are equipped with an outrigger at each corner which can be deployed to provide added stability when operating. The hydraulic arm has a range of attachments that can be equipped including breakers, crushers, drills or loader buckets.
13. The largest BROKK models have diesel motor option, however most models are powered using a three phase 415 volt electricity supply.
14. These machines are operated by a remote control unit which can be attached to a belt and worn around the operator's waist. Alternatively, the control unit can be operated from a stand. The signal from the remote control unit to the machine can be achieved by using either a digital signal (up to 300 metres) or using a cable connection.
15. A key benefit of using a robotic BROKK machine is that it can work in hazardous areas while the operator remains at a distance from the machine, in a position of safety. These machines also eliminate the need for handheld demolition tools which expose operators to hand arm vibration, excessive noise levels and fume or dust inhalation.
16. The model of BROKK involved in the incident was a BROKK 260. The BROKK 260 operated by Mr McLean was owned by Central Demolition Ltd ("the CDL BROKK").

17. The CDL BROKK weighed around 3,000 kg and can be described as follows:
- (a) It comprised a tracked base and rotating turret. An articulated arm was attached to the turret and different tools could be fitted to the free end of the arm.
 - (b) The machine was driven by an electric motor and had to be connected to an electricity supply via a cable in order to operate.
 - (c) It was controlled by a hand held remote control unit which communicated with the machine wirelessly.
 - (d) The remote control unit for the machine had a belt attachment so that it could be worn around the waist of an operator.
 - (e) The control unit for the machine is fitted with a left-hand and right-hand joystick which are used to control the operations of the machine including tracking, slewing and arm/attachment operation.
18. The CDL BROKK had the following features:
- (a) There was an emergency stop button mounted on the machine and there is one on the remote control unit.
 - (b) The remote control unit for the machine (which could be seen by the Inquiry in photograph 9 of production No 3 for Core Cut (report by Ron Knak of JH Burgoyne & Partners dated 7 May 2023)) includes two control levers and several push buttons and switches.
 - (c) Depending on the position of the switches the levers would operate the tracks, the turret or the arm.

- (d) If both of the control levers remain in the neutral position, ie they received no used input for a period of 3 seconds, then the control unit deactivates control of the levers thus preventing any subsequent movement of the machine.
 - (e) In order to reactivate lever control, a button must first be pushed while the levers are in the neutral position.
 - (f) The machine manual refers to this feature as “lever gate”.
 - (g) If there is no radio communication between the machine and the control unit for a period of 2 minutes (ie if there is a fault with the communication equipment or if there is no operator input) then the machine switches off.
 - (h) In such circumstances the power supply to the machine must be isolated and then restored in order to reactivate it.
 - (i) The manual refers to this as “radio limitation”.
19. Mr McLean started working on site in December 2018 at the start of phase two of the demolition works.
 20. He mostly worked night shifts for approximately 6 months carrying out extensive demolition works using Core Cut’s BROKK 400.
 21. By August 2019, the majority of the internal demolition work had been completed and Core Cut Ltd had removed their BROKK 260 machine from the site.
 22. Central Demolition Ltd had a BROKK 160 and BROKK 260 remaining at the site. The BROKK 260 was the CDL BROKK.
 23. There was a request made by Sir Robert McAlpine to Central Demolition Ltd on 21 August 2019 to make two additional openings in the concrete floor.

24. Central Demolition Ltd informed Core Cut Ltd of the need to carry out the works.
25. Core Cut Ltd's Tony McDade attended at the site on or about 20 August 2019 to review what was required. Andrew McGillivray, engineer for Sir Robert McAlpine showed Mr McDade, Mr McLean and Ian Strang of Central Demolition Ltd the work area and what needed to be done.
26. Mr McDade and Mr McLean, in conjunction with Mr Strang, assessed what needed to be done together and decided what the best way would be to carry out the job. They were asked to create two small openings in the concrete floor of level 2.
27. The openings were to have dimensions of 2100 mm by 1100 mm and were to be made in a concrete floor slab which was 150 mm thick. The purpose of the openings was to allow new ducting to be installed for services within the building.
28. To carry out the task, holes needed to be cored in each corner of the openings to be formed. A wall/track saw would then need to be used to cut lines in the concrete between each of the holes.
29. A BROKK machine would then need to be used to break out the structural concrete and form the openings. It was decided that a BROKK 160, which was situated on level 1 was too small to reach the floor slab from below and to take it to level 2 to break out the concrete from above would not be a good option as using the pecker attachment from above would create too much noise and would need to be carried out during a night shift.

30. It was agreed that the CDL BROKK, which was outside the St Enoch Centre would be used to remove the concrete on level 2 from below using the muncher attachment.

22 August 2019

31. Mr McLean was working at the site on 22 August 2019 using the CDL BROKK.
32. The stairs where he was working were at the east end of the St Enoch Centre, near to the Stockwell Street car park. The stairs were situated within the building and were formerly a fire escape within the retail unit. They were of concrete construction and were divided by a single skin concrete block partition along their length. This created two stairwells, with separate entrances at the bottom and top. These could be seen by the Inquiry in photograph 6 of production No 3 for Core Cut (report by Ron Knak of JH Burgoyne & Partners dated 7 May 2023).
33. The stairs involved in the incident are listed as “stair 35” on design drawings, also referred to as “stair 2” on site, and have since been demolished as part of the reconfiguration of the building. The stairs led from a ground floor fire exit to the first floor of the St Enoch Centre and comprised of three individual sets of steps separated by two small landings. If approaching from the bottom, the first two set of stairs have 11 steps each and the final set has 6 steps. The stairs could be seen by the Inquiry in photograph 5 of production No 3 for Core Cut (report by Ron Knak of JH Burgoyne & Partners dated 7 May 2023).

34. The pitch of each individual stair set varies between 31.6 degrees (bottom), 31.7 degrees (middle) and 31.4 degrees (top).
35. BROKK recommends a maximum operating incline of 30 degrees for BROKK 260s.
36. John Allan who acted as banksman while Mr McLean was moving the CDL BROKK called in sick. The role of a banksman was to prevent other site personnel from entering areas or using stairs while a BROKK was being tracked on site. The banksman was not to assist with the operation of a BROKK itself.
37. During the morning of 22 August 2019, Mr McLean had been using a coring machine and tack saw to make openings in the level 2 concrete floor to enable the CDL BROKK to be used to “munch” or break the concrete away from below and form the service bond.
38. In the afternoon Mr McLean began operating the CDL BROKK.
39. Mr McLean was working alone at the material time.
40. At approximately 1430 hours Mr McLean was seen at the bottom of stair 2, shown in photograph 5 of production No 3 for Core Cut (report by Ron Knak of JH Burgoyne & Partners dated 7 May 2023) starting to operate the CDL BROKK.
41. CCTV footage of the outside of the St Enoch Centre shows Mr McLean at approximately 1439 hours switch on the CDL BROKK and begin tracking it through the double door fire escape into the stairwell of stair 2.
42. Mr McLean is shown on the CCTV footage to be positioned behind the machine and to have the control panel around his waist.

43. Mr McLean then tracks the machine in front of him moving into the stairwell of the building and out of the view of the CCTV camera.
44. At approximately 1443 hours, CCTV camera footage shows Mr McLean emerging from the stairwell, retrieving two wooden scaffold boards from a materials storage area close by and then re-enter the stairwell.
45. That at approximately 1445 hours, Mr McLean was captured on CCTV emerging from the stairwell. He is seen having a conversation on his mobile phone before re-entering the stairwell for a final time.
46. That at approximately 1458 hours a team of heating engineers found Mr McLean trapped between the left-hand side of the CDL BROKK and the concrete south wall of the staircase.
47. When Mr McLean was found, the alarm was raised and the site was evacuated. Scottish Fire & Rescue Service, Police Service of Scotland and the Scottish Ambulance Service arrived on site shortly thereafter and a major multi-agency incident was declared. At 1522 hours on 22 August 2019, Mr McLean was pronounced dead at the construction site, St Enoch Centre, Glasgow.
48. The front of Mr McLean's body pointed towards the CDL BROKK and his back was against the wall when he was found.
49. Mr McLean's hands were positioned close to the control levers of the remote control unit which hung around his waist when he was found.
50. The rear left-hand corner of the turret on the CDL BROKK had trapped Mr McLean against the wall.

51. The CDL BROKK was partway up the third set of steps that made up stair 2, almost at level 1.
52. There were wooden scaffold board located partially under the left track of the machine lying up against the pitch of the stairs lengthwise.
53. Another scaffold board was found resting against the wall on the first landing.
54. Both scaffold boards were partially broken midway along their lengths.
55. Police Scotland informed the HSE (Health & Safety Executive) of the incident by telephone at 1605 hours.
56. HM Inspectors Graham Mitchell and Stephen Duffy attended at the site.
57. Following arrival of the emergency services on 22 August 2019 the CDL BROKK was moved slightly to enable recovery of Mr McLean's body and thereafter moved back into place.
58. The control panel of the CDL BROKK could be de-energised using a push button on the panel, and the machine could be isolated electrically using a push button on it.
59. Each of these measures would have prevented the machine from operating.
60. For Mr McLean to have become trapped, the remote control unit must have received some form of operator input no more than 3 seconds before he became trapped.

Post mortem, toxicology and cause of death

61. An autopsy examination took place on 29 August 2019 at the Queen Elizabeth University Hospital, Glasgow. It was conducted by Forensic Pathologist Dr Marjory Turner and Forensic Pathologist Julie McAdam. Crown production 104 is the final report on the post mortem of Mr McLean, issued on 1 May 2020. Crown production 104 also contains a toxicology report on Mr McLean, dated 24 March 2020 by Claire Parks and Dr Hazel Torrance, both Forensic Toxicologists. Their following opinions were to be treated as true and accurate by the Inquiry:

- (a) Mr McLean was seen to have congestion and petechial haemorrhages over his face, neck and upper chest with some areas of pressure pallor on his face and areas of parchmented abrasion on his neck, chest and back. These findings were entirely consistent with him having died as a result of crush asphyxia from being trapped between the wall and the machinery.
- (b) There was no evidence of any associated blunt force injury/trauma related to this.
- (c) There was no evidence of any natural disease that would have caused or contributed to his death.
- (d) Toxicology identified only cocaine metabolites indicating previous use of cocaine. Those metabolites were detected in a preserved blood sample at the following levels:
 - a) ecgonine methyl ester – 0.07 mg/l

b) benzoylcegomine – 0.73 mg/l

(e) The primary cause of death was recorded as 1(a) crush asphyxia (accident at work)

62. The toxicology findings were consistent with Mr McLean having used cocaine at some point prior to his death.

The HSE investigation

63. On 24 August 2019 members of the HSE attended at the site in order that a 3D laser scan of the location of the machine and the surrounding area could be done. HM Specialist Construction Engineering Graham Martin was present during this.

64. On 26 August 2019, Nathan Sayers, Managing Director of BROKK UK Limited and Joakim Johansson, Technician/Trainer for BROKK AB met with the HSE and Police Scotland at the St Enoch Centre, Glasgow. Prior to attempting to move the machine, Mr Johansson carried out a functional check of the control box of the CDL BROKK. It was observed by HM Specialist Inspector Peter Dodd that the stem of the left-hand joystick had a slight bend to the right, that this did not affect the movement of the machine. Every function was checked in test mode and showed that all controls were working normally.

65. The power cable was then connected to the CDL BROKK and it was switched on. Mr Johansson began to operate the machine slowly to check that it correctly responded to the control box, which it did. Mr Johansson then manoeuvred the

CDL BROKK out from the stairwell from a safe position on the first floor of the St Enoch Centre. Mr Johansson powered up the machine and, after removing blocks left by Scottish Fire and Rescue Service, he drove up the remaining stairs without difficulty.

66. Once the CDL BROKK was out of the stairwell and located on the first floor of the St Enoch Centre in an open area, a functional assessment of the machine was conducted by Mr Johansson under observation of HM Specialist Mechanical Engineering Inspector Peter Dodd. No faults were identified during the examination and the machine was deemed to be functioning correctly by Mr Dodd. During examination all the safety features of the CDL BROKK were found to be operational. The machine was subsequently switched off and disconnected from the electrical power source.
67. Mr Johansson thereafter removed the CDL BROKK from stair 2, where the accident happened without difficulty. This can be seen in CCTV Crown label No 1 which shows Mr Johansson operating the CDL BROKK on stair 2.

Guidance regarding the operation of the CDL BROKK and Mr McLean's training and experience

68. Crown production 46 is a true and accurate copy of the operator's manual for the BROKK 260 including the CDL BROKK ("the operator's manual").

69. The operator's manual states that operators should not enter the risk zone of the machine while it is in operation and should always remain uphill of the machine when moving it on incline surfaces.
70. Crown production 4 is a true and accurate copy of a Core Cut method statement for robotic demolition operations (FC/36660/MS) dated 29 October 2018 which addresses the method of moving a BROKK 160/170 to level 2 using the main staircase. It instructs that the operator is to operate the machine via the wireless remote control, and to always be standing above the machine, never downstairs from it. The method statement instructed that BROKK 260 and 400 models were to be lifted onto L2 (level 2) using crane arranged and managed by Central Demolition Limited's appointed crane contractor.
71. Crown production 16 is a true and accurate copy of a Core Cut Job/Task Specific Risk Assessment for use of BROKK robo machine equipment to demolish sections of blockwork and reinforce concretes as instructed on site by Central Demolition Limited, dated 31 January 2019. This records that moving BROKK equipment to upper levels using stairs risks contact with the machine. The control method instructs operators to ensure that they are always above the machine when moving BROKK equipment upstairs.
72. Mr McLean was a skilled and experienced BROKK operator.
73. He was well respected by his colleagues and was known to Central Demolition Limited who had requested that he be involved in the St Enoch demolition works.
74. Mr McLean was a certified BROKK operator with a valid BLOKK card.

75. He had received BROKK training and practical guidance and passed a questionnaire in the presence of a BROKK trainer.
76. Mr McLean completed a BROKK UK refresher training programme on 23 April 2019.
77. Crown production 94 is a true and accurate copy of a BROKK UK Ltd Training Method Statement which records the training received by Mr McLean which was completed on 23 April 2019 and is signed by Mr McLean.
78. During the training completed by Mr McLean on 23 April 2019 Mr McLean indicated, by means of a recent answer to a question, that he knew to stand uphill of the BROKK when working on an incline.
79. Crown production 46 is a true and accurate copy of the BROKK UK Operator Training Manual (“the training manual”) is provided to operators who undergo training provided by BROKK.
80. The training manual states that operators should not enter the risk zone of the machine while it is in operation and should always remain uphill of the machine when moving it on incline surfaces.
81. The training manual warns that if the control circuit is live the machine may move inadvertently and cause a fatal injury.
82. Mr McLean had a CSCS (Construction Skills Certification Scheme) card for diamond drilling that included remote control demolition which was valid to February 2023.

83. He was classed as a skilled diamond driller and sawer by the Drilling & Sawing Association.
84. He was endorsed to undertake remote controlled demolition work.
85. The Drilling & Sawing Association provides a Code of Practice for members.
86. The Code of Practice warns operators not to enter the working radius of the machine and to remain above it while manoeuvring on gradients.
87. In addition Mr McLean had been trained in the following:
 - (a) Basic training in the use of a HILTI diamond wall saw.
 - (b) Manual handling.
 - (c) Operation of Mobile Elevating Work Platforms (MEWPS) with IPAF.
 - (d) Bobcat operator.
 - (e) Water Jetting Association training.
 - (f) First aid.
88. On 3 November 2022 Core Cut Ltd pled guilty to a contravention of section 3(1)(a) of the Management of Health & Safety at Work Regulations 1999 and section 33(1)(c) of the Health & Safety at Work etc Act 1974.
89. The plea was tendered and accepted by the Crown on the express basis that there was no causal link between the contravention and Mr McLean's death. The indictment and agreed Crown narrative were lodged as productions Nos 1 and 2 respectively for Core Cut.

Drug testing

90. Core Cut Ltd regularly screens staff members including Mr McLean for drugs use and alcohol.
91. Members of staff who failed tests were dismissed.
92. On 20 December 2016 Core Cut Ltd dismissed a member of staff called [REDACTED] after he tested positive for cocaine use.
93. On 21 March 2018 Core Cut Ltd dismissed an employee called [REDACTED] after he tested positive for cannabis use. On 15 July 2019 [REDACTED] was dismissed on the grounds of gross misconduct following a positive test for cocaine use.
94. Mr McLean attended a toolbox talk (recorded in production No 20 for Core Cut) on 29 January 2018 at which staff, including Mr McLean, were warned of the dangers associated with drug abuse.
95. Productions Nos 5 - 11 for Core Cut were true and accurate copies of the records of Core Cut Ltd relating to drug and alcohol screening of Mr McLean.
96. Production No 12 for Core Cut was a true and accurate copy of a medical self-assessment declaration form completed by Mr McLean and dated 20 July 2019.
97. Production Nos 13 - 19 were true and accurate copies of records held by Core Cut Ltd demonstrating implementation of the company drugs policy.
98. On the day of the accident Mr McLean displayed no visible signs of intoxication or impairment.

Joint minute of agreement No 2:

1. Production No 4 for Core Cut Ltd, a report by Professor Michael Eddleston, Forensic Clinical Toxicologist, dated 7 January 2024 was agreed as equivalent to the oral evidence of its author to the effect that Mr McLean had probably used cocaine in the 12 hours prior to his death and was probably affected by that use of cocaine.

[6] The Inquiry heard from a number of witnesses:

For the Crown

- (i) Ewan Crocker, Operations Director for Core Cut Ltd.
- (ii) Anthony McDade, Contract Supervisor for Core Cut Ltd.
- (iii) Ian Strang, Site Supervisor for Central Demolition Limited.
- (iv) Graham Martin, Specialist Inspector of Health & Safety.
- (v) Peter Dodd, HM Inspector of Health & Safety,
- (vi) Hugh McCrory, Driller with Core Cut Ltd.
- (vii) Thomas Walker, BROKK Operator with Core Cut Ltd.

Findings sought by Parties in relation to section 26 (a) – (d)

[7] Parties were all agreed about where and when Mr McLean died, where and when the accident resulting in his death occurred, and, the cause of his death. They were also in agreement that the accident leading to his death probably occurred as he had entered the risk zone of the Brokk machine and operated the Brokk machine whilst in that risk zone.

Determination and Reasons in relation to section 26(2) (a) – (d)

[8] My determination in terms of section 26(a) - (d) of the 2016 Act accord with the findings sought by parties. The agreed facts at para [5] above provide the basis for these findings:

- (a) at 1522 hours on 22 August 2019 Mr McLean was pronounced dead at the construction site at St Enoch Centre, Glasgow (agreed fact 47);
- (b) witnesses found Mr McLean trapped between the Brokk machine and a wall at approximately 1458 hours (46). He had been seen on CCTV at approximately 1445 hours outside the centre then entering the stairwell where he was found (45). The accident, therefore, occurred between 1445 and 1458 hours on 22 August 2019;
- (c) post mortem findings were consistent with Mr McLean having died as a result of crush asphyxia from being trapped between the wall and Brokk machine (61);
- (d) When found trapped Mr McLean's back was to the wall, his body pointing towards the Brokk machine (48). His hands were close to the control levers of the remote control used to operate the Brokk. The remote control was round his waist (49). The rear left hand corner of the turret on the Brokk had trapped him against the wall (50). The control levers on the remote control are used to operate the turret (18). If the levers receive no input for 3 seconds the control unit deactivates control of the levers thus preventing any subsequent movement of the machine (18). There is an emergency stop button on the machine and another on the remote control (18). The operator's manual states that operators should not

enter the risk zone of the machine while it is in operation (69). The training manual warns that if the control circuit is live the machine may move inadvertently (81). Mr McLean was fully trained with regard to the use of Brokk machines (74, 75, 76, and 77). All of the safety features of the Brokk were found to be operational and the machine was deemed to be functioning correctly with no faults identified when a functional assessment of the Brokk was carried out under observation of a specialist Inspector of HM Health and Safety executive on 24 August 2019 (64 and 66). From these facts I conclude that Mr McLean was within the risk zone and had been trapped by a part of the Brokk machine which would move when a lever on the remote control around his waist was operated within 3 seconds of having previously been operated. It is a reasonable inference to draw that Mr McLean operated the machine when he was in its risk zone. It cannot be known whether he did so deliberately or inadvertently.

Findings sought by Parties in relation to section 26 (2) (e) – (g)

[9] The Crown and representatives of Corecut Limited, Central Demolition Limited and Robert McAlpine Limited urged the Inquiry to make no findings in relation to section 26(e) to (g) and to make no recommendations in terms of section 26(4).

[10] On behalf of Mr McLean's family the following submissions were made:

"S26 (e) (i) & (ii) – Any precautions which could have been taken and had they been taken might realistically have resulted in the death, or any accident resulting in the death, being avoided.

8. The inquiry heard evidence that Brokk machines did on occasion become 'stuck' when being tracked upstairs by reason of the rear outriggers 'bottoming out' on the

concrete floor surface of the landing. One of the methods employed to free the machine from such a position is to place scaffolding boards under the tracks of the machine against the stairs³. It appears that this is a solution which operators have developed for themselves but nevertheless it was endorsed by Core Cut⁴. It was accepted in evidence by Ewan Crocker and Tony McDade that to place such boards an operator would need to approach the machine or at least move past it in some way. In doing so, an operator inevitably enters the risk zone.

9. It is submitted that when the task of tracking a BROKK machine upstairs is considered against the knowledge that they can, and do, on occasion 'bottom out' and with the knowledge of the solution to be employed by operators, the risks become obvious.

10. The inquiry had the benefit of seeing the video⁵ showing the BROKK technician, Mr Johansson operating the machine. Of note, he removes the remote-control console from his waist and places it on the floor before approaching the machine⁶.

11. There is sufficient evidence to allow the inquiry to conclude that such a control measure might realistically have prevented the accident resulting in the death of Mr McLean: Ewan Crocker agreed that if it was not on the waist of the operator then there was no risk of inadvertent operation of the machine. Further, when asked about Mr Johansson removing the control console, HSE Inspector Mr Martin noted that he removed it 'in case he accidentally hit the controls when you walk towards the machine danger zone'. Finally, HSE Inspector Mr Dodd, told the inquiry in evidence that the risk would be 'greatly reduced'.

12. Accordingly, were that a specified control measure, where an operator required to approach the machine for any reason, and where, for whatever reason, the machine is still 'live' any risks of inadvertent operation are significantly reduced if not eliminated altogether.

S26 (f) – Any defects in any system of working which contributed to the death or any accident resulting in death.

13. The Crown's submissions under this head are adopted in so far as they relate to the fact there were no defects in the BROKK 260 which contributed to the accident.

14. However, it is submitted there was a defect in the system of work in so far as any RAMS did not include the above mentioned control measure

Recommendations under section 26(4) of the 2016 Act.

15. It is submitted on behalf of the Family of Mr McLean that this inquiry recommends that:

- a. A full assessment of any risks associated with tracking Brokk Machines upstairs be undertaken before any such activity is undertaken.
- b. Users of Brokk Machines implement a control measure whereby operators be trained to remove the remote-control console from their waist in addition before approaching the machine for any reason.
- c. Standardised training be provided to operators of Brokk machines in the event they become 'bottomed out' on the basis that the evidence appeared to suggest there are a variety of methods which are at the operator's discretion."

Determination and Reasons in relation to section 26(2) (e) – (g)

[11] I have not made any of the findings sought by Mr McLean's family. In the following paragraphs I will explain why not. I will then go on to detail some other considerations which arose during the Inquiry and will detail why I have made no findings in relation to them.

Removal of remote control from waist of operator

[12] The submission made in this regard proceeds on the basis that it is inevitable that operators of Brokk machines require to enter the risk zone of the machine on occasion of the machine becoming stuck when going upstairs. Two aspects of the evidence are called upon in support: Firstly, it is stated that Mr Crocker and Mr McDade accepted this proposition. I disagree. Both of these witnesses responded in exactly the same way as the other two experienced Brokk operators the Inquiry heard from, Hugh McCrory and Thomas Walker.

All told the Inquiry that they may use scaffolding boards to assist in the event that the Brokk got stuck. All said that the machine would be backed up, the boards put in place, and, then the Brokk would be tracked back up with the boards in place. Mr Crocker referred to taking the machine back to the landing, positioning the boards and then retracking. He specifically said "You don't need to go to where the machine is at that point". When Mr McDade was asked "So to put the boards down you have to approach the machine?" he answered "No. You put the boards down and have the machine track onto the boards". There followed a passage of questioning which clearly confused Mr McDade and within which he agreed that approaching the machine presented risks. I am, however, satisfied that the evidence of all of the trained operators of such a machine that the Inquiry heard from was that they are trained and well aware that they should not enter the risk zone of the machine, and, that if they require to use anything such as a scaffolding board to provide purchase for the machine going up a gradient, the method of doing that is to return the machine to a flat area, place the boards where appropriate, and, then retrack the machine up the gradient. I am also satisfied by their evidence that they are trained and are aware that there are ways of ensuring that the machine will not move ie by pressing the stop button.

[13] Secondly, it was prayed in aid that Mr Johansson of Brokk is seen on video on 24 August 2019 (Crown Label 1) approach the machine and removing the remote control from his waist before doing so. I am not prepared to conclude from Crown Label number 1 that Mr Johansson removed the remote control from his waist before entering the risk zone of the machine. He is seen removing the remote control from round his waist and move forward in the general direction of the machine. However, the footage cuts out and it is simply not

possible to say whether he gets close enough to the machine to be said to be within its risk zone. The officer of the Health and Safety Executive who was present was never asked how close to the machine Mr Johansson got.

[14] Given the line adopted on behalf of Mr McLean's family, it is highly regrettable that the Inquiry did not hear from Mr Johansson about his reason for removing the control panel from his waist and what he did before and after doing so. There had been mention about a link being established to allow him to give evidence from Sweden. In the event I was told that he did not require to give evidence. Had it been made clear on behalf of the family what conclusion the Inquiry would be asked to reach about his actions on Crown Label 1, he could and should have given evidence. In the absence of his evidence, I will not speculate or draw any conclusions about him removing the panel from his waist, what actions he took before doing so, or, what actions he took after doing so.

[15] Accordingly, there are immediately difficulties with the premise upon which the submission that removal of the remote control from his waist might realistically have avoided the accident is made.

[16] I do not agree that the evidence supports the premise that an operator must enter the risk zone of a machine if it gets stuck on stairs. In fact the evidence, as I have detailed elsewhere, was quite the opposite: that operators should not enter the risk zone; that if the machine got stuck on stairs it was to be backed up to a level area, boards placed where necessary, and, the machine tracked back up across the boards; in the event that an operator had to be in that risk zone then pressing the emergency stop button on the remote control would have had the effect of cutting the power supply to the machine (agreed fact 58,

evidence Hugh McCrory, Thomas Walker, Tony McDade). Mr McLean did not press that button. There is no evidence from which the Inquiry can conclude that he would have pressed it if he had removed the remote control from his waist. The crucial safety feature was the pressing of the emergency button. The pressing of that button eliminates the existence of a risk zone around the Brokk machine.

[17] Some witnesses did indeed agree with the proposition that there was reduced risk of inadvertent operation of the machine if the remote control was removed from the operator's waist. They, however, agreed with this as general proposition rather than as a factor which would have prevented the accident with which the Inquiry was concerned. The evidence of Peter Dodds, HM Inspector of Health and Safety, in this regard commended itself to me. When it was put to him that the risk of inadvertent operation is eliminated if the remote control is removed prior to approaching the machine, he answered "I do not agree that it's eliminated. There is a reduced risk of the operator doing it". The implication was, of course, that there is a risk of someone or something else on site touching the control and operating the machine. The line of evidence was not developed. Likewise, there was no evidence of how many others were working on the site on the day in question. It was, however, known that there was no banksman, and therefore no other worker preventing others from approaching Mr McLean's work area, working with him. As I have said, the line of evidence was not developed. It was, however, enough for me to conclude that, on balance, losing control, by removal from his person, of the remote control of the machine he was operating in the circumstances in which he was working without a banksman, was not an action to be commended.

[18] The evidence before the Inquiry did not support the submission that removal of the remote control from his waist of Mr McLean was a precaution which might realistically have resulted in the accident being avoided.

Should the Brokk have been tracked up stairs?

[19] There was evidence led which, at first blush, appeared to have relevance to the questions of precautions which might have avoided the accident and/or may point to a defect in the system of working. It all related to whether the machine in question should have been tracked up the stairs in question. The evidence was in two tranches:

Were the stairs too steep?

[20] Brokk, in its product brochure, indicates an operating incline of 30 degrees for the type of Brokk being operated by Mr McLean (agreed fact 35). At the time of the accident Mr McLean was tracking the machine up a set of six stairs with a gradient of 31.4 degrees. He had already tracked it up two sets of 11 stairs, one set with a gradient of 31.6 degrees and the other 31.7 degrees (34). The question is already answered in the negative by these facts alone. Mr McLean had just successfully tracked the machine up stairs with a steeper gradient. The question has to be considered, however, as HM Inspector of Health and Safety Peter Dodds was of the view that the recommendation of the manufacturer should be adhered to.

[21] When I consider the totality of the evidence, however, I am satisfied that the gradient of the stairs was not a factor in the accident occurring and there are no findings to be made in that regard in terms of section 26 (e) – (g).

[22] That evidence includes what the Inquiry was able to observe on CCTV Crown Label number 1 which was the same machine being brought up the remainder of the stairs post-accident without any difficulty; the evidence of Specialist HM Inspector of Health and safety, Graham Martin. He has experience of such machines and that experience and his observation of the actual machine being moved on the stairs in question led to him opining that he had no concerns about the ability of the machine to perform the task. In addition, evidence from those from who operate these machines regularly was that they would have no concerns about the machine tracking up the stairs in question.

Should a crane have been used to move the Brokk to the first floor?

[23] The need to consider this matter arose from the evidence of Specialist HM Inspector of Health and Safety, Graham Martin who opined that, as the Brokk 260 had been craned into position on site previously, it should have been done on this occasion. There does seem to be something of a contradiction in his position given his previously quoted position that he had no concerns about the Brokk's ability to track up the stairs in question. Mr Martin referred to receiving information from McAlpines about previous use of the crane. However, the only direct evidence before the Inquiry of a crane being used is in the method statement prepared by Corecut Limited and referenced in agreed fact 70. Mr Crocker clarified during his evidence that the method statement covered the getting of equipment onto site at the outset of works. The building was to be refurbished from top to bottom and the method statement makes reference to getting a Brokk 260 to level 2 at a different part of the building where the stairway was too narrow. There is a clear distinction between that situation and the situation this

Inquiry heard about. The Brokk was on this occasion being taken to level 1 and the overwhelming evidence before the Inquiry was to the effect that the machine is built to track upstairs and there was no difficulty with its ability to track up the stairs in question. The Brokk machine in use is designed to climb or track up stairs. There was no need to consider getting it to the first floor in any other way on this occasion.

The position of the operator of the Brokk

[24] At the outset of the Inquiry it appeared that the question of an operator of a Brokk machine operating from below or above the machine might be a factor for consideration. As the Inquiry progressed, however, it became clear that it was not relevant to the circumstances of the accident. The regular operators of Brokk machines who gave evidence were all aware that the training is to position oneself above the machine. However, it was not a factor for consideration in relation to Mr McLean's accident. The Inquiry can draw no conclusions about where Mr McLean was positioned when he was tracking the machine on the stairs. It can only conclude that at some point he moved within the risk zone of the machine.

Absence of formal risk assessment

[25] Corecut Limited accepted that no formal risk assessment was produced for the job being undertaken by Mr McLean (agreed facts 88 and 89). They pled guilty to a contravention of the relevant legislation on the basis that there was no causal link between this and Mr McLean's death. In light of all of the evidence led during the Inquiry I agree that there was no such causal link. The Inquiry heard from Mr McDade of Corecut Limited and Mr Strang of

Central Demolition Limited who had both considered the job beforehand with Mr McLean.

Mr Crocker of Corecut Limited also gave evidence about what had been communicated to him about the job and the way it was to be performed. It was clear that any formal written risk assessment would not have differed from what was decided during the informal risk assessment of the job. The risk assessment being formalised would not have prevented Mr McLean from entering the risk zone of the machine while it was energised.

Decision about Recommendations in terms of section 26(4)

[26] I have not identified any precautions which had they been taken by anyone other than Mr McLean might realistically have resulted in Mr McLean's death or the accident leading to his death being avoided. I have not identified any defects in any system of working which contributed to the death, and any other relevant factors. It follows that I have no recommendations to make.

[27] When considering making recommendations the Inquiry is asked to look to the future and consider if there are any steps which could prevent a similar tragic accident from occurring.

[28] Specifically addressing the recommendations urged upon the Inquiry on behalf of Mr McLean's family, I am not going to make a recommendation that operators of Brokk machines are trained to remove the remote control from their waist before approaching the machine. As stated, I do not consider there is an evidential basis upon which I could make such a recommendation. Further, such a measure is unnecessary given the training already in place and amply spoken to by the operators of Brokk machines from which the Inquiry heard

that operators should not enter the risk zone of the machine and should use the stop button on the remote control to de-energise the machine if and when required. Removal of the remote control from the waist of the operator would be superfluous. The suggestion that I make a recommendation that a full assessment of any risks associated with tracking Brokk Machines upstairs be undertaken before any such activity is undertaken is linked in the submission made on behalf of Mr McLean's family to the requirement to include the need to remove the remote control from the waist of the operator. I do not agree that there was a defect in the working system given the absence of such a measure and, therefore I do not make the recommendation sought. The Inquiry was, finally, urged to make a recommendation that Standardised training be provided to operators of Brokk machines in the event they become "bottomed out" on the basis that the evidence appeared to suggest there are a variety of methods which are at the operator's discretion. There is no evidential basis for such a recommendation. The suggestion proceeds on the assumption that Mr McLean entered the risk zone of the machine because it had "bottomed out". It is not an unreasonable assumption that at some point the machine "bottomed out" and got stuck. The presence of the scaffolding boards, one positioned partially under the left track of the machine is highly suggestive of that. However, it requires speculation or guesswork to say that that Mr McLean entered the risk zone of the machine because it had bottomed out. The evidence from every Brokk trained operator from whom the Inquiry heard was that in the event of bottoming out the machine would be taken back to a level area, boards placed down and then the machine tracked onto the boards. Whilst it is possible to say from the evidence that the accident occurred because

Mr McLean was in the risk zone of the machine, it cannot say why he was in that position. To do so involves speculation or guesswork and the Inquiry cannot indulge in that.

[29] It is worth stressing again that the purpose of the Inquiry making any recommendations is to realistically prevent other deaths in similar circumstances to those of Mr McLean. I have carefully considered all of the existing training which operators of Brokk machines receive and of which they are, from the evidence, aware. I have carefully considered the safety features of the machine itself. Having done so, I am satisfied that there is no need for recommendations to be made.

Conclusion

[30] I wish to conclude by formally offering my previously expressed condolences to the loved ones of Derek McLean for his tragic loss.