SHERIFFDOM OF LOTHIAN AND BORDERS AT HADDINGTON

DETERMINATION by **PETER GILLAM, Esquire** Sheriff of the Sheriffdom of Lothian and Borders at Haddington following an Inquiry held into the death of **STEPHEN CLARK PATON,** date of birth 28 February 1972 who resided at 2 Wamphrey Cottages, North Berwick

INQUIRY HELD UNDER
ACCIDENTS AND SUDDEN DEATHS
INQUIRY (SCOTLAND) ACT 1976
SECTION 1(1)(a)
Court Ref: B231/08

HADDINGTON 25th AUGUST 2008

The Sheriff, makes the following **Determination:**

(1) That pursuant to section 6(1)(a) Stephen Clark Paton, date of birth, 28 February 1972, residing at 2 Wamphrey Cottages, North Berwick (hereinafter referred to the "deceased") died on 30 October 2006 at 10.48am at Halfland Barns, North Berwick. His death was a result of an accident that occurred at his workplace at Halfland Barns, North Berwick on the same date at approximately 9.45am.

(2) That pursuant to section 6(1)(b) the cause of death was electrocution after the deceased came into contact with the metal part of a conveyer which was being used at the farm at Halfland Barns. At the time of the contact the metal part of the conveyor was live.

(3) That, pursuant to section 6(1)(c) the following are reasonable precautions whereby the accident might have been avoided:-

(a) Regular inspections and testing of electrical installations and equipment for any defects;
(b) Rectification of any defects found during such inspection and testing;
(c) The installation of residual circuit devices (hereinafter referred to as "R.C.Ds") on all electrical circuits;

(4) That pursuant to section 6(1)(d) the following are defects in the system of working which contributed to the accident resulting in the death:-

1. The use of the pressure washer to spray water on a conveyor which had attached to it an electric motor;

(5) That pursuant to section 6(1)(e) the following facts are relevant to the circumstances of the death:-

(a) There was a defect in the installation of the electric motor which powered the conveyor resulting in the earth wire being not connected to the earth terminal;
(b) The electric motor attached to the conveyor was aligned in such a way as to allow water to accumulate inside the motor;
(c) The use of a pressure washer on the conveyor caused water to enter the casing of the electric motor attached to the conveyor;
(d) The lack of an R.C.D. on the electric circuit being used to power the electric motor resulted in the failure in the electrical circuit being tripped and cut out when a fault in the electrical system occurred.

NOTE:-

Introduction:

(1) In this Fatal Accident Inquiry the following parties appeared and were represented:-

Procurator Fiscal Depute: Ms Main
Deceased's family and employer: Mr MacPherson

I heard evidence on the 18 and 20 August 2008. I heard evidence from the following witnesses:-

Pauline Paton (widow of deceased)
Neil Paton (father of deceased)
Kevin Martin (employee of Halfland Mushrooms Ltd)
Eric Gray (employee of Halfland Mushrooms Ltd)
Ian Dickson (farmworker present at the time of the accident)
George Woods (Paramedic)
PC Lindsay Boath
Lawrence Murray (Health and Safety Executive)
John Madden (Health and Safety Executive)

And by affidavits from:-

Gordon Bruce (Forensic Scientist)
Dr Gabrielle Salucci (G.P.)
PC Cummings Reid
PC Norma Forsyth
Professor G Kernbach-Wighton (Dr who carried out post-mortem)
Carolyn Helen Lowrie (Forensic Scientist)

(2) There was no dispute between the parties on the documentary evidence which was produced in this case, including post-mortem report, photographs, forensic reports, police notebooks, medical records and health and safety executive report. The time and place of death were not disputed. In these circumstances a substantial part of the evidence could be produced by the use of affidavits. These affidavits were available to both parties and were read by them.

The parties

The deceased had been married to Pauline Jane Paton for just less than 8 years. There are 3 children of the marriage aged 3, 5 and 6 years. He began work at Halfland Mushrooms Ltd at Halfland Barns, North Berwick in January 2001. Before that he worked on a local farm. He had obtained a diploma in agriculture, spraying, forklift truck driving and working with chemicals. He had no electrical training or qualifications.

Halfland Mushrooms Ltd is a company which grows mushrooms at Halfland Barns Farm. It is a family business and the directors are the deceased's parents, Neil Paton and Catherine Paton. The business was run by Neil Paton and the deceased was an employee who managed the farm. He was the grower. He did both heavy physical work and also management. He was safety conscious. He would do minor electrical work on the premises but other electrical work was done by electrical contractors.

Halfland Mushrooms Ltd grows mushrooms in 12 sheds on the farm. The mushrooms are covered with compost and after 3 croppings, the spent compost is removed from the sheds.

Machinery:

The spent compost which has been used in the growing of the mushrooms lies on netting. This netting is winched from the shed to a conveyor at the entrance of the shed. The conveyor elevates the compost from ground level to the height of a trailer attached to a tractor. The tractor then takes the trailer containing the spent compost to a local farm.

The conveyor is driven by an electric motor which rotates a drum at the base of the conveyor. This drum drives a belt to the top of the conveyor where there is another stationary drum.

The electric motor is a 3 phase electric motor. It is driven by electricity supplied from an electric cable containing 3 live conductors and a fourth wire which is the earth wire. There is a control panel situated on a wooden frame outside the shed. This control panel contains an isolating switch and an on / off switch. In this particular electrical circuit there was also an extension lead which led from the control frame back to the power source in a shed.

There was no R.C.D. on the electrical circuit being used at the time. There was a miniature circuit breaker installed above the distribution board in the

shed, however, this device was ineffective because the current was too low to trip the breaker.

The accident:

On the morning of the 30 October 2006 shed number 11 was being emptied of spent compost. Three of the 4 shelves had been emptied. The conveyor was having problems and it was constantly stopping. A new gearbox had been fitted to the conveyor over the previous weekend by the deceased and his father.

Kevin Martin was a labourer who was standing on the trailer of the tractor levelling out the compost as it reached the trailer. Martin Pesl was also working in the emptying of the compost. When the conveyor jammed, Martin Pesl used a high pressure water washer to spray water on the conveyor. The purpose of this was to wash away compost which, it was thought, was causing the machinery to jam. There is a photograph produced of an observation hole on the side of the conveyor which shows compost lodged within the framework of the conveyor. This observation hole is on the other side of the conveyor to the position of the electric motor.

When Martin Pesl either touched or put the lance of the water pressure washer near to the metal of the conveyor there was arcing causing sparks to be visible. This happened on a couple of occasions.

The deceased was working nearby on some pallets. Ian Dickson was the tractor driver. He went towards where the deceased was working to inform him that there was a problem. As he did so the deceased came round the corner. The deceased asked what was wrong and Ian Dickson told him that sparks were coming out of the conveyor. Ian Dickson went to go and switch off the power.

> The deceased approached the conveyor and then Mr Dickson saw him fall to the ground. Mr Dickson thought that he had tripped. He fell on the opposite side of the conveyor to where the motor was situated.

Thereafter, Kevin Martin went to the farmhouse to inform Neil Paton, the deceased's father of the accident. Neil Paton attended and an ambulance and a doctor were called. C.P.R was attempted. When the ambulance came the deceased was put into the ambulance. Appropriate drugs were administered and resuscitation continued. However, at 10.48am it was decided that there was no point in continuing to try to resuscitate the deceased. He was pronounced dead at 10.48am. The police attended and preserved the scene. They took statements from witnesses. The police notified the Health and Safety Executive who carried out an investigation.

Health and Safety Investigation

Lawrence Murray arrived at the scene on the same date. He was informed of the circumstances of the accident and took photographs. He issued notices and took possession of various items of equipment.

Mr Murray then called in his colleague John Madden who is a specialist inspector of electrical engineering. He attended at the scene of the accident the following day with Mr Murray. He examined various items. He took photographs. He removed various items and took these items back to his office and carried out further investigations. Mr Madden produced a report which is number 8 of process. It is a very thorough report. In his summary, Mr Madden states that the deceased was electrocuted because;

(i) the exposed metalwork of the conveyor and the drive motor were not earthed because the circuit protective conductor in supply to the motor had been pulled away from the motor's earth terminal; and
(ii) water had entered the motor and collected within its frame when it was being washed down using a pressure washer; and
(iii) the water had damaged the water soluble varnish on the motor coils, creating a conducting part between the coils and the unearthed frame of the motor; and
(iv) the motor frame and consequently the metal structure of the conveyor became live when the supply to the motor was switched on ; and
(v) he touched the live metalwork causing current to flow through him to earth over a hand to foot path.

The circuit protective conductor became detached from the earth terminal because it had been cut too short at the time of installation and because the cable was not securely gripped by the compression gland on the motor's terminal box. A very poor standard of the cable's connection to the motor was the primary cause of the accident.

The water was able to enter and collect in the motor because the motor was not built to prevent high pressure jets of water entering its enclosure and because the motor had been orientated on the conveyor with its drain hole in the wrong position. Pressure washing the motor was a dangerous activity, especially while a supply to the motor was switched on. Whoever installed the motor on the conveyor did not pay sufficient attention the manufacturer's installation instructions.

The accident would not have happened if the earth connection to the motor had been intact, or if water had not been able to enter the motor and collect inside it with the motor coils immersed in it.

The British Standard for electrical installations stipulates that, on farms, socket outlets should be protected by a Residual Current Device (R.C.D). There was no R.C.D fitted on the supply to the electric motor. If there had been, Mr Paton would not have been electrocuted.

It was clear that the deceased touched the metal frame of the conveyor which was live. The question that Mr Madden had to determine was how that that metal became live. He examined the extension cable. That was in good condition. He examined the socket outlet situated between the mushroom sheds. He again found that to be in sound condition with no defects. He also examined the point of supply which was situated in a shed. He again found

this to be in order. He looked for an R.C.D. He found none. He was emphatic on this point. There was a 16amp circuit breaker on the electricity supply. However, the current was too low to cause the circuit breaker to trip and therefore was ineffective in this instance.

It was only when Mr Madden examined the electric motor, when he took it back to his office, that the cause of the accident became clear. He removed the plate covering the motor terminal box. There he discovered that although the main 3 phase terminals were connected, the earth wire was not connected to the earth terminal which had corroded. It would appear that whoever installed the motor had cut the 4 wires to the same length. The 3 live wires had a shorter distant to travel than the earth wire to be connected. Therefore the earth wire was always going to be the first to suffer stress if there was any pull on the wires going into the terminal box. This was a fault in the installation. From the evidence before me, it was not possible to determine who installed the motor. I was told that the original motor on the conveyor had been replaced about 2½ years prior to the accident. The Health and Safety Inspector was informed by an unnamed witness that the motor had been installed by the deceased. The deceased's father informed the Inquiry that a qualified electrical contractor installed the motor.

The lack of the earth connection was a primary cause of the accident. If the earth connection had been made properly the deceased was not have been electrocuted.

Mr Madden further examined the electric motor. He removed a cover over the electric coils. When he did this, there were signs of water ingress on the coils and on the motor casing. Furthermore, the varnish which covered the electrical coils inside the motor had been removed as a result of the water coming into contact with the coils. The effect of the water inside the motor was twofold. Firstly, it removed the insulating varnish on the coils. This produced a live connection between the coils and the casing of the motor. Secondly, the water provided a conductor to assist in the transmission of the electricity from the coils to the metal case.

The view expressed by Mr Madden was that the water ingress had been caused by the use of the pressure washer. He was of the view that the water had entered the motor through the hole in the casing through which the wires had entered.

Furthermore, the water problem had been exacerbated by the way the electric motor had been fixed to the elevator. The electric motor casing had a drain hole. However, due to the way in which the motor was fixed to the conveyor, the drain hole was not at the lowest point of the motor. Instead of being at 6o'clock it was approximately at 8o'clock. This resulted in any water inside the motor below the 8o'clock level not draining from the motor as it should have done. This meant that the water was in the motor for a longer period than would have been the case otherwise. This in turn provided more opportunity for the water to dissolve the varnish on the coils.

Mr Madden also expressed the view that the system should have had a R.C.D installed. There were R.C.Ds on the premises. However, there was no R.C.D on this particular power supply. If there had been one the supply would have been cut off automatically and the accident would not have happened.

Mr Madden also expressed the view that anyone who started working on electrical equipment or equipment connected to an electrical supply should first of all switch off the power. It would appear that this was not done on this occasion.

Finally, Mr Madden emphasised the need for any electrical equipment and installations of all forms to be examined and tested on a regular basis. He suggested that such equipment and installation should be tested once a year by a qualified electrician. If that had been done, the faults on the system which caused this accident would, in all probability, have been discovered and effective measures taken to prevent such an accident.

Submissions of Parties

I was provided with a very full and helpful written submission by the Procurator Fiscal Depute. This submission rehearsed the evidence. The Procurator Fiscal Depute also submitted that there were 3 reasonable precautions which might have avoided the accident. Firstly, the circuit protective conductor and the supply to the motor should have been connected to the motor earth's terminal. Secondly, the motor should have been mounted with the drain hole in the correct position to prevent water entering the motor when it was being washed down using a pressure washer and collecting within its frames. Thirdly,the supply to the motor should have been protected by an R.C.D.

She also submitted that the Inquiry should recommend:-

1. On farms that electrical equipment should be wired up and then maintained by a competent person who is usually an electrician. This would ensure that the motor was correctly mounted and earthed. This would ensure compliance also with the requirement to fit an R.C.D.
2. Farm electrical systems should be inspected and tested periodically. The testing should be done by an electrician.

On behalf of the family and employer, Mr Macpherson said that he took very little exception to the submissions made by the Procurator Fiscal Depute. He submitted that there were 4 elements which caused the accident. Firstly, there was the poor earth connection. Secondly, there was the position of the electric motor on the conveyor. Thirdly, there was the absence of a R.C.D on this particular system. Fourthly, there was the use of the pressure washer.

He submitted that the first 3 elements arose solely as a result of the installation of the motor and the power supply. He submitted that the installer of the equipment did not do it properly.

Mr MacPherson submitted that the only precaution that I should determine should be taken was a precaution against using a pressure washer where electrical equipment was nearby. He suggested that there was no defect in the system of working.

Conclusions and Determination

My responsibility is to make a determination on this matter pursuant to Section 6 of the 1976 Act. This I have done. It is not the function of an Inquiry to make any findings of fault or to apportion blame. One of the purposes of an Inquiry is to investigate matters so as to avoid a repetition of the accident. Causation does have a role.

As I have indicated, I was impressed by the investigation carried out by Mr Madden. His was a thorough investigation. He pinpointed the cause of the accident and the contributing factors. It was not possible to determine who installed the motor. There was evidence that the deceased was a safety conscious person. He carried out minor electrical repairs. However, the evidence suggested that any major electrical repairs and installations were carried out by electrical contractors. Having said this, there was a workshop on the site. In addition, the deceased and his father had changed the gearbox on the elevator a few days prior to the accident happening.

There is no doubt in my mind that the primary cause of the accident was the faulty earth connection in the electric motor. This was probably caused by a failure to allow extra length for the earth wire to be connected when the motor was installed. The earth terminal was located at a further distance from the main 3 phase terminals. If all the wires were cut to the same length there would be pressure on the earth wire to reach the earth terminal. It would be stretched and any further pressure on the wires would be first applied to that earth terminal. This pressure, coupled with corrosion at the earth terminal probably led to the earth wire being detached from the earth terminal.

Further, as Mr Madden pointed out, this alone would not have caused the accident. There had to be a second fault. When Mr Madden checked the motor he found the resistance was far lower than would he would have expected. As there was no fault in the cable or the socket outlet, the second fault required to be within the motor itself. It was when he dismantled the motor that he noticed the evidence of corrosion in the coil and water residue in the casing. This led him to the view that the varnish on the coils which acted as an insulating material had been eroded by the presence of water. The presence of water also acted as the conductor between the coils and the outer casing thus rendering the motor live. As the motor was attached to the conveyor by a metal plate, and as there was no earth connection, the metal on the conveyor became live. This was evidenced by the arcing caused when the metal lance of the power hose either touched or came very close to the elevator.

The use of the power washer on the machinery and the lack of an R.C. D. were also very important factors. If the washer had not been used or an R.C.D. installed the accident would not have happened.

This sequence of events had tragic consequences for the deceased and his family. Their loss is profound. It is difficult to imagine the impact that this accident has had, and will have on the whole family. I have expressed my sympathy to the family for their loss. However, there is little anyone can do to alleviate the pain of their loss.

I do not know whether this Inquiry, occurring as it did almost 2 years after the event, helped or hindered in the healing process. It obviously brought back memories of events which have caused the family distress. However, if it has helped to explain what happened to their husband, father and son, then perhaps the exercise has been worth while.

A Fatal Accident Inquiry is mandatory after a death at work. I understand that there is a review of a Fatal Accident Inquiries taking place at the moment. I would hope that consideration in that review would be given to the possibility of a discretion being given to the Court not to hold an inquiry if the family of the deceased, after receiving legal advice, put forward strong reasons for such an inquiry not taking place. I would imagine, that in some circumstances such an inquiry would only hinder rather than help the healing process and impose further distress to the family.

I would also hope that if an inquiry is to take place, it should do so as soon as the inquiries are completed, which hopefully would happen within months, rather than years after the event.

Finally, I would record my appreciation to the Procurator Fiscal Depute, and to the agent for the family and the employer for the way in which they conducted this Inquiry. It was helpful to me and, I hope, it minimised the distress and pain of the family.

Sheriff of Lothian and Borders at Haddington

Dated 25th August 2008