

SHERIFFDOM OF GRAMPIAN, HIGHLAND AND ISLANDS AT STONEHAVEN

DETERMINATION

In terms of Section 6 of the Fatal
Accidents and Sudden Deaths Inquiry
(Scotland) Act 1976.

**In relation to the circumstances of the
deaths of**

**ANN MARIE MERRIGAN or
COPELAND, date of birth 18th March
1962, NIAMH MARIA COPELAND, date
of birth 14th May 1997 and CIARA
JENNY COPELAND, date of birth 24th
October 2000**

REPRESENTATION:-

1. For the Crown - Tom Bowman, Procurator Fiscal Depute.
2. For William Whyte Cargo Handlers Limited (Crane Owners and Operators) and Hamish Anderson (retired crane driver) - Miss Bonomy.
3. Terex — Demag Limited (Crane Manufacturers) - Mr Gribben.
4. Bureau Veritas (Inspectors of Mobile Cranes under the Lifting Operations and Lifting Equipment Regulations 1998 (LOLER) — Mrs Burgess.
5. Health & Safety Executive — Miss Anderson.
6. Colin McLachlan (Driver of other vehicle involved in fatal road traffic collision) — Miss Baxendale.
7. Tesco Insurance — Insurers of the late Mrs Anne Marie Copeland — Mr Kelly.
8. Barry Copeland (on his own behalf).

WITNESSES:-**A — FOR THE CROWN**

1. Rosemary Wintle — housewife.
2. Ailsa Duncan — Student teacher.
3. Carole Smith — Performance Analyst.
4. Isobel McLachlan — Property Developer.
5. Carol Grant — Housewife.
6. Doctor Kornelia Lesco — Analytical Chemist.
7. Colin McLachlan — Retired.
8. Louise Shennan — Primary School Teacher.
9. Alan Irvine — Agricultural Engineer.
10. Donald Gilles — Health & Safety Adviser.
11. Colin Cunningham — Lorry Driver.
12. Sergeant Neil Grant — Police Officer.
13. Kenneth McLeod — Crane Mechanic.
14. PC Derek Thow — Police Officer.
15. Colin Urquhart — Hydraulic Engineer.
16. Douglas Connor — Health & Safety Executive Inspector.
17. Hamish Anderson — Retired Crane Driver (formerly employed by William Whyte's).
18. Brian Groves — Depot Manager, William Whyte's.
19. Norman Purves — Senior After-Sales Manager (Terex Demag Limited).
20. Steven Del Testa — Crane Driver (employed by William Whyte's).
21. Douglas Reid — Health & Safety Quality Manager (employed by William Whyte's).
22. Alan MacPherson — Scene of Crimes Officer.

23. Lawrence Whyte — (Managing Director of William Whyte's).
24. Alexander Carmichael — Chief Engineer (Bureau Veritas).
25. David Fray — Crane and Lifting Specialist (Bureau Veritas),
26. Allan Fell — Engineer/Surveyor (Bureau Veritas).
27. Tim Watson — Consultant Mechanical Engineer.

B — FOR BUREAU VERITAS

- 1 Martin Banesik — Principal Engineer (Allianz Insurance Company).

C — FOR WILLIAM WHYTE'S

1. Danny Pointin — Accident Investigator.
2. Mark Hooghiemstra — Managing Director of Aldbar Limited.

D — FOR TEREX DEMAG LIMITED

David McIntyre — Consulting Engineer (Director of Cadogans)

E — FOR HEALTH & SAFETY EXECUTIVE

Peter Lennon (HSE Principal Inspector).

PRODUCTIONS:

With the exception of Colin McLachlan and Tesco Insurance, all parties had lodged productions which in some cases were very substantial. A large number of these productions were not referred to in the evidence.

ABERDEEN, 25 January, 2012.

The Sheriff, having resumed consideration of the Inquiry **DETERMINES:-**

(1) In terms of Section 6(1)(a) of the Act, that Ann Marie Merrigan or Copeland, date of birth 18th March 1962, Niamh Maria Copeland, date of birth 14th May 1997 and Ciara Jenny Copeland date of birth 24th October 2000 died on 9th January 2008 at about 0845 hours on the A92 Stonehaven to Montrose Road at Warburton Farm, St. Cyrus, Aberdeenshire.

(2) In terms of Section 6(1)(b) of the Act, that the cause of death of Ann Marie Merrigan or Copeland was multiple necessarily and instantaneously fatal injuries sustained as a driver **in a vehicular collision; that the cause of death of Niamh Maria Copeland was a necessarily and instantaneously fatal neck injury sustained as a rear offside passenger involved** in a vehicular collision; that the cause of death of Ciara Jenny Copeland was necessarily and instantaneously fatal neck injuries sustained as the front seat passenger **involved in a vehicular collision; that the cause of the accident was a loss of control by Mrs Ann Marie Copeland of Citroen Saxo motor vehicle** registered number V190 KKV, being driven by her in a southerly direction along the A92 at the mid point of a double bend approaching **Warburton Farm, St. Cyrus; that the loss of control of the Saxo caused the car to veer into the northbound carriageway such as to present its nearside towards northbound traffic including a Citroen Berlingo motor vehicle registered number S258 DOS driven by Colin McLachlan ; that Mr McLachlan was unable to avoid a collision with the Saxo with the consequence that the front of the Berlingo collided with the nearside of the Saxo; that the loss of control of the Citroen Saxo by the late Mrs Ann Marie Copeland was attributable to contamination of the southbound carriageway of the A92, particularly on the bend at the Warburton Farm access; that the contaminant was hydraulic or lubricating oil which had the effect of considerably reducing the grip of the Citroen Saxo's tyres on the roadway in the direction that Mrs Copeland was travelling; that, on the balance of probabilities, the contaminant was hydraulic oil deposited on the road by a mobile crane, model PPM ATT400, registered number S727 KSO driven southbound on the A92 shortly prior to the accident by Hamish Anderson acting in the course of his employment with William Whyte Cargo Handlers Limited; that the contaminant was deposited on the roadway as a result of a hole developing in a hydraulic hose in connection with the crane's suspension system which hose at some stage in the crane's operational life been incorrectly positioned so as to allow the hose to abrade against part of the transmission mounting bracket.**

(3) In terms of Section 6(1)(c) of the Act, that, at the time of the accident, had the crane's operators, William Whyte's Cargo Handlers Limited had in place for the crane a programme of planned preventative maintenance based at least on the recommendations contained in the manufacturer's manual and had William Whyte's employees not erroneously regarded the six monthly inspection of the crane in terms of the Regulations under LOLER as applying also to the roadworthiness of the crane, then the fact that the hose in question was in a position that it was abrading against part of the transmission mounting, it is likely that proper maintenance of the crane would have resulted in that fault being observed and corrected by re-routing of the hose and as a result, it is unlikely that the hose would have failed and caused leakage of hydraulic fluid at the locus, and that the deaths may have thereby have been avoided.

(4) In terms of Section 6(1)(d) of the Act, that at the time of the accident, had William Whyte's had in place a system of inspection and planned preventative maintenance and also ensured that crane drivers such as Hamish Anderson actually carried out the daily and weekly checks he was required to do, such failures contributed to the likelihood of the hose failing and leaking hydraulic fluid at considerable pressure on to public roads and thereby causing the road surface to become dangerously slippery.

(5) In terms of Section 6(1)(e), (A) RECOMMENDS that manufacturers of hydraulic hoses for mobile cranes give further consideration as to whether or not, in addition to regular inspection and maintenance of hoses, there should be issued guidance in relation to the service life of hydraulic hoses; (B) RECOMMENDS that the report forms for thorough examination under the LOLER regulations be revised to include clear warnings that such inspections only relate to the crane's lifting operations and that it remains the individual crane owner's responsibility to ensure that at all times his crane is roadworthy, in an efficient state and in good repair in terms of the Provision and Use of Work Equipment Regulations 1988 (PUWER) and the Road Vehicles (Construction and Use) Regulations 1986, Regulation 100 as far as roadworthiness of the crane is concerned; (C) RECOMMENDS that the United Kingdom Government enact legislation as a matter of urgency with the effect of

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removing the current exemption applying to mobile cranes from undergoing a compulsory regular test of roadworthiness.

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INTRODUCTION:-

(6) In the course of this Inquiry, evidence was adduced over twenty days between 7th March 2011 and 2nd November 2011. Submissions were heard over three further days between 12th and 14th December 2011. All parties helpfully provided written submissions which in some cases were very detailed indeed. In fact, the submissions on behalf of both the crane manufacturers, Terex Demag Limited and the Health & Safety Executive rehearsed the entire evidence led in the case. It is not my intention to refer to every submission which was made but all submissions were considered in arriving at this Determination.

(7) About half way through the evidence, I was advised that Bureau Veritas Limited had carried out a number of six monthly inspections of the crane under LOLER. Bureau Veritas sought leave to enter the Inquiry late and I allowed that motion. This resulted in a delay in the evidence being heard because of the need to obtain transcripts of the recorded evidence thus far.

PRE-ACCIDENT EVIDENCE:-

(8) Prior to the fatal road traffic accident on 9th January 2008 at about 0845 hours on the A92 Stonehaven to Montrose road, Rosemary Wintle dropped her son off at school at about 8 am and was returning home when she encountered a large vehicle at Bridgeton. She described it as green and yellow in colour and being "big, like a combine" and stated that it could have been a crane. She said it was very big, oblong and solid and it had big wheels. When she pulled out to overtake the vehicle, a greasy film appeared on her windscreen. This film appeared when she was nearer the cab end of the vehicle. The film obscured her view and use of her windscreen

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washers made it worse. She was shown a photograph of the index crane, and confirmed that it might be the vehicle which she saw.

(9) Witness Ailsa Duncan, spoke of becoming aware of a huge vehicle carrying some sort of crane shortly before 8.30 am as she climbed the hill after North Water Bridge. She described the vehicle as a lorry but not a typical lorry and stated that it was almost at a standstill as it was climbing the hill. A spray appeared on her windscreen. It got worse when she used her windscreen wipers. When she reached the top of the hill, she lost control of her car and ended up partially on the northbound lane. She had to go to Kwik Fit to request assistance to clean the windscreen. She did not positively identify the index crane from a photograph shown of it.

THE FATAL ROAD TRAFFIC ACCIDENT:-

(10) Very shortly before the collision, witness Carole Smith gave evidence that she had lost control of her Ford Focus motor vehicle as she was approaching the second of two bends at what she described as "the Warburton corner" which is at the accident locus. She had been travelling at no more than 60 miles per hour prior to the bends and slowed down on approach. It was very windy so she slowed down more than she would normally. She didn't feel as though she had lost control of her vehicle. It just slid onto the wrong side of the road. It was more slippery than ice. She was shocked by what had happened and pulled into a lay-by slightly further up the road.

(11) Witness Carole Grant negotiated the same double bend shortly after Carole Smith. She was driving a four wheel drive vehicle but had no difficulties although she noted that her traction control came on as she negotiated the second bend. She pulled into the lay-by to speak to Carole Smith. Carole Smith witnessed the fatal accident as she was speaking to Carole Grant. As she was describing her own experience of loss of control of her vehicle to Carole Grant, she saw a small green car spin out of control as it was coming round the second bend. Her impression was that it happened where she had lost control. The green vehicle skidded towards another vehicle which was travelling in a northbound direction. This was a vehicle

being driven by witness Colin McLachlan who was accompanied by his wife in the front passenger seat. He recalls that he was travelling at about 50 miles per hour. As he approached the double bend he saw another car quite suddenly and unexpectedly lose control. He described the rear of the car approaching him swung out to its left. It came across the road at an angle and the nearside of the vehicle collided with the front of his vehicle. There was nothing Mr McLachlan could do to avoid a collision. Even if he had had time to apply his brakes there was insufficient time for them to be effective. Mr McLachlan lives near the bend referred to. He had driven the road a substantial number of times, and in his view there were no inherent difficulties with the bend. When he first saw the approaching vehicle he had no concerns at all in relation to its speed or position. Mr McLachlan stated that he was a keen motorist and had previously been involved in motor sport. He estimated the speed of Mrs Copeland's car at between 35 — 45 miles per hour. A collision was inevitable and according to the witness, "not even a top rally driver could have done anything with that skid".

(12) No witness gave evidence which in any way suggested that the driving standard of Mrs Copeland prior to the accident was anything other than normal and appropriate for the perceived road conditions. Witness Allan Irvine spoke to her "normal" driving prior to the collision and the eye witnesses to the collision stated that in their view there was nothing that she could have done to avoid the collision.

CONTAMINATION OF THE SOUTHBOUND CARRIAGEWAY:-

(13) Evidence was led from a large number of people to the effect that, at or near the locus of the accident, the A92 was extremely slippery in places. Carole Smith lost control of her vehicle. Carole Grant observed that the road was very slippy. Colin McLachlan witnessed the arrival of a fire engine from the north. As it pulled to a halt it seemed to slew sideways to the nearside. Louise Shennan was driving immediately behind the Berlingo driven by Colin McLachlan. She noticed that it was "slidey" when she got out of her vehicle. Alan Irvine, driving behind the Saxo, witnessed the collision and tried to stop and slipped into the side onto the grass. His ABS braking system came on. Two vehicles behind him were unable to stop and collided behind him. When walking about at the locus, he noticed that it was

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slippery, "like on ice". Donald Gilles was driving southbound behind the secondary collision referred to. His ABS operated. When he got out of his vehicle he found the road slippery. Sergeant Grant spoke to the slippiness of the road as did Police Constable Derek Thow who stated that when he got out of his police vehicle he almost fell over as it was so slippery. Scene of Crimes Officer Alan McPherson spoke to it being slippery and slidey underfoot. Both Thomas Fleming and Malcolm Alistair had given statements about the fact that the road was very slippery.

(14) In addition, Colin Cunningham was a local authority driver tasked with gritting the A92 following the accident. He left the depot at Stonehaven and travelled southbound along the A92. He noticed areas requiring treatment at Dunnoter Woods entrance, a few other stretches before Inverbervie. The number of areas requiring treatment increased from Johnshaven and from that point on the whole width of the carriageway seemed to be affected. He could see the spill as there were dry areas that had turned white due to salt which had been applied earlier. The areas with contamination remained dark because it had been raining.

POLICE ENQUIRIES AS TO THE NATURE OF THE CONTAMINANT:-

(15) Witness Alan McPherson took swabs from the surface of the road, four in total and submitted these to SEPA for analysis. These swabs were analysed by Doctor Kornelia Lesko who prepared an analysis which is Crown production No. 24. One swab, the batch control swab, was found to contain no contaminant but the remaining three swabs showed the presence of lubricating oil. The samples were

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Alan McPherson had taken one swab from what he regarded as an uncontaminated section of the road which on analysis proved to be contaminated. Doctor Lesko was not able to say whether or not the lubricant oil was hydraulic oil as her laboratory was not equipped to carry out further analysis in this regard, but she confirmed that lubricant oil is a large group of oils made up of many different types of which hydraulic oil is one.

(16) No attempt was made by the police to take a sample of any contaminant from the tyres of the Saxo motor vehicle to see if it matched the contaminant on the road ((Amy,

surface. In addition, when a few days later, suspicion of the police focussed upon the William Whyte Cargo Handlers Limited mobile crane driven by Hamish Anderson on the day of the accident, no attempt was made to take a sample of hydraulic oil which had collected on the underside of the vehicle to see if it matched the contaminant on the surface of the A92.

(17) Sergeant Neil Grant and Constable Gary Marr were assigned the roles of collision investigators and carried out appropriate duties. Sergeant Grant compiled his report which is Crown Production 8. He carried a walk through of the scene to establish what evidence there was. He concluded that the green Saxo was being driven south at the locus negotiating a right hand bend. The vehicle lost control causing it to travel broadside into the northbound lane and into the path of the Berlingo.

(18) Sergeant Grant and Constable Marr carried out skid tests in an attempt to calculate the co-efficient of sliding friction for the tyre/road interface at the locus. They used a police motor vehicle as the vehicles involved in the accident were extensively damaged. They chose to carry out the skid test uphill straddling the centre of the road and travelling in the same direction of the Berlingo. The results produced by the "SKIDMAN" appear at page 53. Sergeant Grant found that the co-efficient of sliding friction for the stretch of road was 0.608 but it was acknowledged that this did not reflect the co-efficient of sliding friction at the point on the road where Mrs Copeland lost control of her car. It was anticipated that a partially damp road surface would have a co-efficient of sliding friction of between 0.6 and 0.8. At pages 45 to 48 of the report, Sergeant Grant explains how this co-efficient of sliding friction combined with measurements of the bend can be used to determine the maximum theoretical speed at which a vehicle travelling south could negotiate the bend safely. The conclusion was that if the road had been uncontaminated, the maximum theoretical speed would be 68 miles per hour plus or minus ten per cent giving a range between 61 and 75 miles per hour. If the maximum theoretical speed is reached, the walls of the tyre make contact with the road surface and leave distinctive clam shell marks. There were no such marks on the tyres of the Saxo in this case. That also pointed to the fact that Mrs Copeland had not been driving at or above the critical speed. Mr Mark Hooghiemstra produced on the instructions of

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William Whyte, a report which is effectively a road traffic accident report. Mr Hooghiemstra is critical of the police in that since they had come to the conclusion that it was too dangerous to carry out a skidman test on the southbound carriageway at the exact locus, they had nevertheless not carried out further tests. He made reference to an item of equipment known as a drag sled which is a weighted segment of a vehicle tyre with a calibrated spring balance. This item can be used where it is not practical or safe to carry out conventional skid tests using a skidman. In this case the evidence had indicated that the police had been unable to locate a drag sled and therefore had not been able to carry out other tests. He felt that the police should have been more creative and constructive and should have been able to construct their own drag sled but did not elaborate on how this could be achieved. He seemed to be of the view that there was insufficient information available to allow the police collision investigator to conclude that the contamination on the roadway was the only or indeed a major factor in relation to the cause of the collision. He seemed initially to suggest in his evidence that because the police had not obtained an accurate value for the co-efficient of sliding friction at the exact locus, then it was not established that the road was slippery. What was particularly surprising is it seems that he was not aware of the evidence of a large number of eye witnesses who had stated that the road was extremely slippery and also that the eye witnesses to the accident had indicated that Mrs Copeland was going very much slowly than the stated critical maximum speed for the bend. Because of the presence of this considerable body of evidence, I cannot see that in this particular case the absence of an accurate value for the co-efficient **of sliding friction is of great relevance.**

(19) In my view it is reasonable to conclude on the balance of probabilities that the road surface at the locus of the skid test and the accident locus would be similar and that it therefore follows that however flawed the skid test undertaken by Grampian Police may have been, the results suggest that even had Mrs Copeland been driving around the bend on partly contaminated road and partly uncontaminated road, she ought to have been able to negotiate the corners safely at between 61 and 75 miles per hour. The fact that she was unable to do so at a much lower speed and in light of the evidence which indicates she was driving at an appropriate manner and also taking into account that the police discovered no faults with her motor vehicle which could have given rise to the accident, then the cause of Mrs Copeland's loss of

control of her vehicle was likely to be contamination on the road surface. It was suggested on behalf of William Whyte's that the bends at Warburton Farm comprised a road traffic black spot but there did not seem to be any real evidence in support of this and in any event it was contradicted by Colin McLachlan, an experienced driver, who had driven the road a great number of times and as stated gave evidence which I accepted that there was no such history.

(20) I comment at this stage that Colin McLachlan was faced with a situation in which he was given insufficient time to react in any way. I conclude that there is nothing that Mr McLachlan could have done to avoid the collision.

POLICE INVESTIGATION — SOURCE OF CONTAMINATION:-

(21) Police Constable Derek Thow arrived at the scene of the accident at about 9.50 on 9th January 2008. His duty was to attempt to identify the source of the contamination on the A92. He visited Stagecoach in Stonehaven as they operate a bus service between Stonehaven and Montrose but there was no report of oil or diesel loss. He enquired of local businesses on the A92 as to whether or not there was any CCTV footage available but there was not. Having read the witness statements which had resulted from a publicity campaign (witnesses Rosemary Wintle and Ailsa Duncan), Constable Thow formed the impression that the vehicle concerned might be a crane. The descriptions of the vehicle and the colours were familiar to Constable Thow and he made contact with William Whyte Cargo Handlers Limited. Whyte's confirmed that a mobile crane had driven down the A92 southwards that morning. The vehicle was a 35-ton PTM registration number S727 KSO and the driver was Hamish Anderson, an employee of William Whyte's. Constable Thow contacted Hamish Anderson who confirmed that he had a burst hydraulic pipe which he noticed when he was setting up his crane on arrival at Montrose. Mr Anderson was to attend a day's training at Petrofac at Montrose. Constable Thow then met personally with Hamish Anderson on 16th January 2008 at Aberdeen docks and noted a discussion in his notebook (Crown Production 23, page 298). At page 11 of the notebook, Constable Thow records that Hamish Anderson then told him that the training at Petrofac was cancelled due to high winds and at that point Hamish Anderson folded up the mobile crane and stated that that was

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when the pipe had burst and oil flew in the air. This was a different version of events from that given by Mr Anderson on the telephone on the previous occasion.

POST-ACCIDENT EVIDENCE:-

(22) Kenneth McLeod is a self employed crane mechanic. As at January 2008 he would carry out work for William Whyte's as and when required. They would call him in the event of a breakdown. This could be two to three times per week or less. On the day of the accident, Kenneth McLeod was contacted by Brian Groves, an employee of William Whyte. Mr Groves called about 10.30 to explain that Hamish Anderson had reported a hydraulic leak on his crane, which he had discovered at the training centre in Montrose. Mr McLeod went straight there and estimates he arrived at Montrose between 11.30 and 11.45 am. Mr McLeod first could not see any leak so he asked Hamish Anderson to start and stop the machine in order to pressurise the hoses. At that point he could see the spray of oil running down the edge of the transmission mounting. Mr McLeod stated that earlier on that morning he had met with Hamish Anderson in Portlethen. Had been called in to fit a glow plug.

(23) Witness Hamish Anderson stated that he arrived at Petrofac in Montrose at about 8 am and set up his crane by putting out the outriggers. When he folded the mobile crane up after the training was cancelled because of the windy weather he noticed oil on top of the water on the ground. He did not know where or when the pipe had started to leak. He accepted that it had possibly started to leak during the journey south on the A92 earlier that morning. Mr Anderson described the oil spill on the ground as being a small six inch patch. He explained that he meant that the pipe was spraying out oil over a six inch spread and was spreading on the ground over the entire width of the crane. When he returned to Dyce, Hamish Anderson had replaced about six or seven gallons of hydraulic oil and agreed that this was probably to replace the fluid lost in the leak. He had previously told Constable Thow that he had replaced four or five gallons but stated that he did not know which was the correct amount.

(24) Mr McLeod's evidence was that after the glow plug had been replaced on the day of the accident, Hamish Anderson left Portlethen at about 7.30 am. Hamish

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(25) Crown expert Timothy Watson, Consulting Engineer, described the hydropneumatic suspension system on the mobile crane. The hose in question provided pressurised fluid to one of the suspension valves that play a role in sensing whether or not the crane is level. The operating pressure of the system is between 160 and 190 bar. With that in mind, his opinion was that even the smallest pinhole in a hose would lead to leakage. The hose in question was a two wire braided hose with a maximum working pressure of 400 bar. The innermost layer is a rubber hose. On top of that there are two sleeves made up of wires woven into a braid to reinforce the inner hose. Without this wire braiding, the hose would simply burst under pressure. On top of the wire braiding is an outer cover that is designed to protect the wire and prevent corrosion from the elements. Timothy Watson had inspected the damaged hose and protective sleeve and found two areas of damage. One area is where the wire braiding is exposed and the other where it is worn through. He

measured the hole in the wire braiding approximately 3mm in diameter. As the material making up the inner layer is elastic, when pressure is applied, it can open up wider and reduce again once pressure has been removed. He agreed with the evidence of Daniel Pointin, an accident investigator engaged by William Whyte's that it would be impossible to measure the size of the hole in the inner layer without the hose being cut open. Given that there was no evidence of any fluid on the road leading into Petrofac, Mr Watson stated that as the hose was connected to the suspension valve units, it could be that the majority of the flow would be when the system was self levelling, for example, on bends. It was unlikely that the entire loss occurred at Petrofac. The hole in the hose would open progressively. Mr Pointin had opined in his evidence that he did not think it was possible to have a pinhole in the inner tubing with a 2 mm hole in the wire braiding but accepted in cross-

examination that without opening up the hose he could not be certain of the failure mode. Mr Pointin's evidence was that for a hole of 3 mm, it would take twenty four seconds to lose 4 to 5 gallons of fluid. For a hole of 2 mm he estimated fifty three seconds. If the hole in the inner tubing is smaller than 2 to 3 mm and the time taken to lose 4 to 5 gallons (or 6 to 7 gallons, depending on which evidence is correct) then it would take substantially longer for the fluid to escape. When cross-examined by the Crown, Mr Pointin accepted that because of the very high pressure in the hydraulic system the fluid would form a fine spray and on a damp road surface the hydraulic oil would spread.

(26) David McIntyre, Consultant Engineer called on behalf of Terex Demag Limited took the view that as the hole was in the top surface, the fluid would initially spray upwards onto the underside of the chassis. The underside would then become coated in fluid which would then drop down. When the vehicle was travelling, there would be other forces causing a wider distribution. In his opinion, the hydraulic oil may well have dropped in patches on to the road. It would spread very well on its own but any other fluid such as rain would have a tendency to assist spreading. Mr McIntyre's view that the hole in the wire braiding would probably have got wider as the rupture started. He likened the mechanism to a volcano. The only way to know for sure would be to put the hose on a test rig, pump it up and measure the leakage.

(27) The timeframes for the various journeys along the A92 by Hamish Anderson, Rosemary Wintle and Ailsa Duncan tended to coincide. It seems more likely than not that Rosemary Wintle and Ailsa Duncan travelled behind the mobile crane driven by Hamish Anderson. On the question of the timeframe for his journey south on the A92, Hamish Anderson's evidence was unreliable. In addition, he was unclear about the likely time that the journey would have taken. The evidence of Mrs Wintle and Mrs Duncan is therefore to be preferred.

(28) I accept that there is a lack of clear scientific evidence connecting the deposits of hydraulic oil found on the A92 and the oil in the crane being driven down the road by Hamish Anderson. However, Mr Anderson's evidence in certain respects was vague, namely about when he first noticed the leak, what the timings were on his journey south and also the volume of hydraulic oil replaced. Therefore, I

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 take the view that, on the balance of probabilities, I--find- __ that the hydraulic oil contaminating the A92 at the accident locus was deposited there by the mobile crane driven by Hamish Anderson.

ABRASION OF THE HOSE:-

(29) All parties agreed that abrasion was the cause of failure of the hose. Both Timothy Watson and David McIntyre carried out inspections of the mobile crane and hose and both largely agreed as to how the hose came to be abraded to the point of failure. The hose in question has a swept bend at one end where it connects to the correction valve named "AVG". This swept bend can be installed at different angles and if correctly angled it will run to the other connection point without coming into contact with any other component. The markings on the protective cover and damaged hose and the transmission mounting lead Mr McIntyre and Mr Watson to conclude that at some point in the crane's history, the damaged hose had been incorrectly routed so as to be in a position that it abraded against the transmission mounting bracket.

(30) It was agreed by the experts that the hose in question was manufactured between April and June 1998. It is likely that this was the original hose. Paint markings on the transmission mounting give a clue as to how long the hose had been in the wrong position. The mobile crane came into Whyte's possession some time between July and October 2006. At some point thereafter it would have been sprayed in Whyte's colours of green and yellow. The views of the experts is that the hose was in the wrong position before it was resprayed in Whyte's colours and therefore possibly before it came into Whyte's possession. If this hypothesis is accepted then the hose was in the wrong position for in excess of fourteen months. This particular hose was covered by a protective sleeve and the experts agreed that it would take a considerable time to abrade through that sleeve and all of the reinforcing layers of the hose in order to reach bursting point. Signs of a problem might have been apparent in July 2007, the time when the thorough examination under the LOLER Regulations 1998 was carried out. The view of the experts is that it is possible to route the hose so that it does not come into contact with any other component. There is no evidence of a design fault in the routing of the hose.

SHOULD THE ABRAISION HAVE BEEN DISCOVERED BEFORE FAILURE OF THE HOSE?:-

(31) Crown Production 9 is a report by Timothy Watson and at page 78 Mr Watson sets out the basis for the obligation upon the owner of a mobile crane to carry out maintenance:-

When used off public roads — the Provision and Use of Work Equipment Regulations 1998 (PUWER).

When on public roads — The Road Vehicles (Construction and Use) Regulations 1986 (As Amended). Unlike the majority of large goods vehicles, mobile cranes are currently exempt from both the Heavy Goods Vehicles Operators Licensing Regulations and the Plating and Testing Regulations. The effect of this is that the standards for the maintenance of mobile cranes are not laid down and that they are not subject to an annual MOT at a designated test centre. However, in terms of the Road Vehicles (Construction and Use) Regulations (Regulation 100) they should at all times be in such condition "that no danger is caused or is likely to be caused to any person in or on the vehicle or on a road". The requirement to inspect and maintain the mobile crane was that of William Whyte's.

(32) Timothy Watson explained that a complete record should be kept out of all maintenance carried out at prescribed intervals and also of work carried out in between. A complete record is important to build a picture about what may be going wrong with the mobile crane. If a defect is repeated that can suggest a problem with how the crane is being used or a problem relating to design. It also assists the owner in determining if maintenance is being carried out at the correct intervals. Mr Watson explained that *10e* Terex Demag produced a manual for the mobile crane in question (Terex Production 33, Volume 2). That sets out a recommended maintenance schedule for the crane in a series of task lists at intervals set by time or number of hours usage. In neither case should this be exceeded. The aim of such a system is to catch worn or wearing parts before they become significant or have the potential to cause damage. This is known as planned preventative maintenance.

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The evidence of the witnesses from William Whyte's was that they had no planned preventative maintenance system in place and repairs were carried out simply on the basis that an item is fixed when it breaks, and no record is taken of the repair or defect. The view of William Whyte's employees was that there is no defect once it has been fixed.

(33) The crane manual makes the following recommendation:-

"The checking of flexible hosing is required six monthly or at a thousand engine hours in task list F under which "hydraulic circuit" requires the owner to **"check for leaks on the hydraulic circuit, and change any damaged serviceable hoses"**. David McIntyre explained that this manual is based upon preventative maintenance. A crane is a complex piece of equipment and it is necessary to inspect it at intervals decided by usage and age. Based upon the proved fact that Whyte's owned the mobile crane between approximately July 2006 and the accident in 2008, this particular check should have been carried out at least three times. It is clear from the evidence that it was never carried out.

MAINTENANCE CARRIED OUT ON THE INDEX CRANE BY WILLIAM WHYTE'S:-

(34) The evidence of Kenneth McLeod, Cohn Urquhart, Hamish Anderson, Brian Groves, Steven Del Testa and Lawrence Whyte leads to the following observations:-

- (a) **Whyte's had in place a system for daily and weekly checks on mobile cranes. This was in terms of Form F91.**
- (b) Hamish Anderson seldom undertook the checks. He simply "ticked the boxes" without carrying out the checks and no one was checking to see whether he was carrying **out there duties**.



- (c) Hamish Anderson did not record any defects occurring during a working week because he took the view that once they were fixed they were not defects.
- (d) No one in Whyte's checked the Form 91 against invoices relating to the mobile crane.
- (e) Hamish Anderson received no induction or refresher training in respect of the daily and weekly checks.
- (f) Kenneth McLeod and Colin Urquhart were contractors who were asked to carry out repairs only in the event of a breakdown.
- (g) Kenneth McLeod would be asked to carry out services on mobile cranes. These were not services in the true meaning of the word but restricted to checking oil levels and filters and did not include inspection of the hydraulic system or hoses.

(35) The index mobile crane was subject to a "thorough examination" under LOLER every six months. These thorough examinations were carried out by Alan Fell of Bureau Veritas who was referred to by many of the witnesses as "the insurance man". The purpose and scope of the thorough examination appears to have been misunderstood by all of the Whyte's witnesses who seem to have regarded **it** as being an MOT for a crane — a "thorough inspection" of the mobile crane from top to bottom. Some of the William Whyte witnesses indicated that they believe that it also checked roadworthiness. In the circumstances, it is clear to me that as **all three of the possible lines of defence (per Mr. Watson) to avoid failure** of the hose were absent, it inevitable that at some time or other, the abrasion would result in rupture of the hose and in all likelihood, at considerable pressure.

(36) Defects reported to Whyte's following thorough examinations were not always repaired before the next thorough examination was carried out.

(37) Timothy Watson (who was present throughout most of the evidence) reviewed the maintenance records for the mobile crane and concluded that a system of breakdown maintenance only was totally unacceptable and that Whyte's had confused the "thorough examination", with maintenance of the crane. In effect, there were three lines of defence against defects in hydraulic hoses. Firstly, there was the

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daily and weekly checks. It was clear from the evidence that these were not actually taking place. The second line of defence was a system of planned preventative maintenance of which there was none and the third line of defence was the thorough examination under LOLER Regulations. However, that is not a test of roadworthiness but ensuring the continued safe use of the crane's lifting equipment. It is also entirely separate from the requirements of PUWER Regulation 6.

(38) Accordingly, there being no effective planned maintenance regime in place at Whyte's as at January 2008, the routing of the hose which ultimately failed was not picked up either in daily or weekly checks or during servicing of the crane. There was evidence that a hose in the position of the index hose was at risk of abrasion and ultimately failure and it is accepted that this was a known risk within the industry. The evidence suggested that anyone would be able to see the hose in its faulty position when standing at the offside of the crane looking inwards.

THOROUGH EXAMINATIONS UNDER LOLER:-

(39) LOLER is targeted at specific risks associated with the operation of the lifting equipment and it applies over and above the Construction and Use Regulations and PUWER. Evidence was given by Martin Banesik, principal engineer with Allianz on behalf of Bureau Veritas that the requirements under LOLER are statutory requirements for a competent person to undertake a thorough examination of lifting equipment. It was neither necessary nor practical for the competent person to be trained on a particular make and model of mobile crane. The important element of competence is the ability to detect defects and understand their significance so that the defect can be categorised for reporting. This was contrary to the evidence of Tim Watson who's view was that the competent person should have model specific training. That is not a matter in which I feel it is appropriate from the evidence I have heard to make a specific recommendation.

(40) Mr Banesik also stated in his report at page 4 that "the wheels, suspension assemblies and axles of a crane such as the one in question are primarily components related to roadworthiness. However, I would expect any engineer surveyor undertaking a thorough examination to consider whether these elements

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are essential for the stability of the crane for lifting operations due to any "free on wheels" duties (where the crane is capable of carrying a load forward slowly on its own wheels). Where they are essential for stability during lifting operations, then they must be assessed for defect. Where they are not, they do not form part of the scope of thorough examination and need not be considered." Mr. Banesik did not appear to contradict the evidence of Tim Watson to the effect that if Mr. Fell did not know the function of the index hose, he should inspect it. Such inspection, according to the witness, would involve only visual inspection for signs of seepage or leakage.

(41) As at January 2008, the evidence from Whyte's witnesses made it clear that Whyte's relied largely on the six month thorough examinations of their cranes by Bureau Veritas. However, there was evidence that successive thorough examination reports for the index crane that certain defects remained unattended to by Whyte's over eighteen months.

(42) The question arises to the role of Bureau Veritas as to whether or not their engineer, Allan Fell, should have noticed the incorrect routing. Tim Watson's view was that if Mr Fell did not know whether or not the hose had any role in any lifting operation then he should adopt the "default" position and should examine it. Mr Fell, who examined the index crane in July 2007 indicated in his evidence that he had looked at the hose which failed but had noted nothing untoward. Taking the evidence as a whole, whereas we do not know the exact condition of the hose and its protective sleeve as at July 2007, at that time it is more likely than not that the hose was in an incorrectly routed position then and that fact should have been noted as such by Mr Fell and upon being noted it would have been reasonable for some further investigation to have followed at that point by way of tactile examination providing the hydraulic system was depressurised. That being said, it is clear that the prime responsibility lay not with Bureau Veritas but with Whyte's and that action should have been taken by them through proper application of a preventative maintenance scheme rather than to rely on Bureau Veritas' thorough examinations. Bureau Veritas are appointed to carry out the LOLER thorough examination by an insurance company which pays the cost of the examination. I do accept that the thorough examination report states that it proceeds on the basis of LOLER but I think the term "thorough examination" itself is capable of causing 40¹ ilit4,4sWn` CI I have

therefore recommended that consideration be given to amending the current report form to make it crystal clear to crane owners that "thorough examination" has nothing to do with roadworthiness of the crane and that that aspect is the crane owner's responsibility.

(43) Although it is clear that at the time of the accident, William Whyte's had a defective system of work in respect that there was no regime of preventative maintenance, a failure to carry out daily and weekly checks and an unwarranted reliance on thorough examination reports by Bureau Veritas, evidence was led on behalf of Whyte's that they now have a preventative maintenance scheme in place and this was accepted by Tim Watson. According to Mr Watson, a few tweaks in the scheme might be advisable but in the absence of detailed information about what these adjustments would require, I find it unnecessary to make any recommendations in relation to Whyte's current maintenance and inspection regime.

EXEMPTION OF MOBILE CRANES FROM MOTS:-

(44) Tim Watson made reference to Crown Production 10 which is a Department of Transport Consultation document in which it is recommended that because there are now considerably more mobile cranes on the road than 30 to 40 years ago and that they are very much larger and more complex, and particularly that the UK Government currently does not meet an EU Directive in this regard that it has been recommended to the UK Government that legislation is enacted to remove the exemption. On the basis of the circumstances of the present Inquiry and on the basis that it would seem absolutely illogical that far smaller and less complex large good vehicles require such examination, it seems appropriate to me that I make the recommendation which I have made.

SERVICE LIFE OF HYDRAULIC HOSES:-

(45) Much evidence was led in relation to this particular issue. There was evidence of the German DIN 20066: 2002-10 standard which prescribed a working life of six years and a storage life of two years for hydraulic hoses. This does not apply within the UK. The evidence of MacIntyre and Watson was that the application

of such a standard might be a useful back stop but both of these witnesses were wary of adopting a prescriptive approach. They both were of the view that a risk assessment approach was far safer but it may be that a risk assessment approach should continue to be encouraged but with a back stop prescriptive element built in.

On the basis of the evidence led at this Inquiry, I am unable to make a definite recommendation except to suggest that the industry to-consider the position.

THE ROLE OF THE HSE:-

(46) In his submissions, Mr Copeland appears to be of the view that he feels that this is a case in which the Health and Safety Executive should have been involved. In his final submission he asks the court to recommend the need for a much greater role for the HSE in road traffic accidents where work related vehicles are involved. All other parties disagree with this and in its written submissions, the HSE at pages 42 to 49 and also in its supplementary submissions, states that the responsibility for investigating such accidents should remain with the police. I respectfully agree with this submission. Leaving aside the question of the finite resources of HSE, it is clear that the police are better equipped for investigating fatal road traffic accidents. I agree with the HSE submission that the circumstances of this case do not demonstrate a flaw in the policy but rather an example of flawed implementation of the policy. I do not think it is looking at matters too simplistically with regard to the circumstances of the present case to say that my understanding is that had the police reported to HSE that they had discovered serious management shortcomings at William Whyte's in respect that there was no system of preventative maintenance, there was no six monthly/thousand hours check as to the safety of the hydraulic system, that although there were documents indicating that daily and weekly checks were being carried out that in fact no such checks were being carried out and that Whyte's were relying too heavily on the thorough examinations under LOLER as roadworthiness checks (which they weren't) then that would have presented a situation in which HSE were extremely likely to have become involved at least to the extent of serving an enforcement/improvement notice on Whyte's. When the police visited Whyte's premises, they had sight of the daily and weekly check list duly completed, invoices for repair of individual cranes and reports of thorough examinations by Bureau Veritas and concluded that there was a system of

maintenance in place. Standing the evidence which has been led at this Inquiry, there were serious management failures at Whyte's in January 2008 but that was not appreciated by the police officer who probably did not have a clear idea what he should be looking for.

(47) Therefore, I conclude, that because HSE in the present case were not advised of serious management failures, there was no duty or need for them to become involved and I cannot see that it is any way a fault of the HSE that their decision not to be involved was anything other than correct.

(48) In his submissions, Mr Copeland is to an extent critical of the police and the Crown office and procurator fiscal service. I agree, however with the Crown's submission to the effect that such considerations are not relevant to a determination of a fatal accident inquiry.

(49) Finally, at the conclusion of submissions, I commended agents and Mr Copeland for their substantial contribution. Particular mention should be made of Mr Copeland. His questioning of all the witnesses was highly relevant and he has displayed great courage, dignity and professionalism throughout the conduct of this Inquiry. The consequences of this fatal road traffic collision were devastating — the sudden and premature loss of a wife and two daughters must have been devastating to Mr Copeland. I conjoin with all others involved in the conduct of this Inquiry in conveying to Mr Copeland my sincere condolences for his tragic loss.