

Scientific Evidence
in
the fatal fire of Mr Oury Jalloh

Ms Nadine Saeed

Initiative in Gedenken an Oury Jalloh e.V.
Colbestr. 19
10245 Berlin

Mr Iain Peck

15th June 2015

Bachelor of Science in Biological Sciences and a Master of Science in Forensic Science. Practising forensic scientist since April 1998, specialising in the investigation of fires and related incidents since January 2000.

Received training in the area of Fire Investigation and undergone competency assessment against defined standards for reporting in this area. Formerly a Senior Scientist in the Fire Investigation Unit at the London Laboratory of the Forensic Science Service. Currently a Fire Investigator and Director at Prometheus Forensic Services.

Investigated over 450 fire scenes and carried out laboratory examinations on items from many more fire-related cases.

Holds Sweet and Maxwell Checked Expert Witness Status 2012, part of the National Crime Agency (NCA) Expert Advisor Database and was an assessor for the Council for the Registration of Forensic Practitioners (CRFP) until its demise in 2009. A Member of the Chartered Society of Forensic Sciences.

Prometheus Forensic Services holds Home Office subcontractor approval for Fire Scene Investigation.

Signature

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DECLARATION

- I. I understand that my overriding duty is to the court rather than to the parties that instruct me, and I have complied with that duty. I have set out in my report what I understand from those instructing me to be the questions in respect of which my opinion as an expert is required.
- II. All of the matters on which I have expressed an opinion lie within my field of expertise.
- III. The interpretation and conclusions are dependent upon the information provided; if this should change, it may be necessary for me to revise my interpretation and conclusions. Any such considerations are best carried out prior to the trial date.
- IV. To assist the Court, conclusions may be drawn which are a consequence of the writer's experience, knowledge, consideration and observations. Such conclusions are those of the writer. It is for the court to weigh the value of such evidence.
- V. I have no connection with any parties, witnesses or advisors, which could lead to a conflict of interest with regard to the matters under consideration on this case.
- VI. I confirm that I have not entered into any arrangement whereby the amount or payment of my fees is in any way dependent upon the outcome of the case under investigation.

STATEMENT OF TRUTH

I confirm that in so far as the facts stated in my report are within my own knowledge, I have made clear which they are and believe them to be true; and that the opinions expressed represent my true and complete professional opinion.

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INTRODUCTION

1. On the 1st of April 2014 I was contacted by the Initiative in Remembrance of Oury Jalloh, e.V., based in Germany and asked if I could assist them by reviewing the scientific evidence in the death of Mr Oury Jalloh.
2. I have been instructed to examine the scientific evidence in this case with particular reference to the investigation of the fire, its nature, the examination of the scene and to comment on the likely cause. Accordingly I have reviewed and assessed the available information concerning the nature of the fire itself and the investigation that followed. I have not examined the scene or any exhibits. The following observations are based on the contents of the statements, reports, videos and the photographs supplied together with my own extensive experience of cases similar to this one. The materials I have reviewed are included in an appendix.
3. This report outlines the circumstances of this case, as I understand them, concerning a fire that occurred at Dessau Police Station, Wolfgangstrasse 25, 06844 Dessau on the 7th of January 2005 at approximately 12:05pm.
4. It has been alleged that Mr Oury Jalloh started the fire which caused his own death whilst he was restrained in hand and ankle cuffs in detention cell 5. This report addresses the evidence presented in respect of this by various individuals. The report continues with an account of my own observations and goes on to discuss the scientific findings in light of these. Finally it brings the various strands together and points out the strengths and weaknesses in the available evidence by way of a concluding summary.

INFORMATION

5. On the 7th of January 2005 Mr Oury Jalloh had been brought to Dessau Police Station after allegedly resisting arrest and causing criminal damage. He was placed in detention cell 5 and restrained as officers were apparently concerned about Mr Jalloh being under the influence of drugs and alcohol. It has been alleged that Mr Jalloh refused to give a blood sample and hit his head against a table.
6. At approximately 12:05pm on the 7th January 2005 there was a fire in detention cell Number 5 at Dessau Police Station, Wolfgangstrasse 25, Dessau.

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7. Mr Oury Jalloh was present in the detention cell at the time of the fire and was found deceased. Photographs (VTS_01_1.VOB.Standbild001-003 & 005) taken after the fire showed that Mr Jalloh had been lying on his back on a mattress that was on a platform slightly raised off the floor. Mr Jalloh was restrained at the wrists and ankles with metal shackles that were fixed to mounting points on the platform beneath the mattress and the wall. His right wrist was shackled to the wall, his left wrist and both ankles were shackled to the platform.
8. There was a cracked tile near where the right wrist had been shackled to the wall. There was no smoke staining within the crack in the tile and it appeared clean. This indicated, in my opinion, that the crack occurred after the fire possibly as a result of the expansion and then contraction of the tile by being heated and then cooled when the fire was extinguished.
9. The photographs taken inside the cell showed brown/yellow staining to the tiled floor around the raised platform. There also appeared to be run marks leading from the mattress. I understand that analysis of the mattress foam filling indicated that it was polyurethane (PU). When PU is heated it becomes a liquid and as such the brown/yellow staining was most likely the result of the flow of burning foam filling. Additionally the associated run marks could be due to a water/PU foam mixture after the fire had been extinguished.
10. There were no images, made available to me, of the cell or mattress after Mr Jalloh's body had been removed or of the cell after the examination of the fire had taken place. Additionally there was no documented record, made available to me, that detailed the fire investigation carried out in cell 5.
11. In the video taken after the fire there was smoke staining evident on the corridor walls leading down onto the level where the detention cells were located. Smoke staining on the door at the end of the corridor off which spurred cell 5 (where Mr Jalloh was held) indicated that it had been open during the fire. The door to cell 5 had smoke staining across the upper parts of the interior surface of the door and on the hinge side of the door surround. This smoke staining indicated, in my opinion, that the door for cell 5 had been open for the majority of the fire's duration. In addition the smoke staining on the cell door was a similar level to that in the corridor outside. The

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smoke staining inside cell 5 was only at floor level in the vicinity of the mattress, suggesting that the door had been opened at an early stage of smoke deposition in the room.

12. The lowest level of burning within the cell was located on and around the mattress on the left side of the room. Therefore the patterns of burning indicated that the fire had started and been mainly confined to the mattress, Mr Jalloh's clothing and body. All the combustible items in the area had been burnt to some degree including the plastic shackle guards. The mattress was burnt across its entire surface. These were the only endemic combustible materials in cell 5.
13. Mr Jalloh was 170 cm tall and had a body mass of 55 kilograms (kg). His body was 100% covered with mostly fourth degree burns and a very isolated (back) area of third degree burns. The burn damage on the right side of Mr Jalloh's body was more developed than on the left (Bratzke 2nd post mortem) which could indicate that the fire started on the right side. Dr Portz appeared to agree and indicated in his report that the fire started in the middle of the mattress near the cracked tile in the area where the wall and platform meet on the body's right side. There was burn induced amputation of the ends and middle segments of the fingers on the left hand. The post mortem images indicated that there were also circular marks on the left wrist of Mr Jalloh possibly where the shackle had been tightly fastened. Dr. Bohnert's report dated 1st December 2011 indicated that the burn damage on the corpse could be explained with a fire duration of an estimated half an hour.
14. The post mortem photograph 1 (*Abb 2: Hochgradige Brandzehrung an der Korperruckseite*) showed a view of Mr Jalloh's back. There appeared to be a protected area of skin which extended from his right shoulder towards the middle of the back and down to his waist. His right buttock also appeared to have been partially protected. These areas of protection indicated, in my view, that Mr Jalloh had been lying on his back from the early stages of the fire.
15. The detention cell comprised tiled walls and a tiled floor. A report by Dr. Portz indicated that the dimensions of the room were approximately 450 centimetres (cm) (length) by 240 cm (width) by 255 cm (height). An entrance door gave access to the cell; its dimensions were 209 cm (height) by 94 cm (width). There was a window in

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the cell which remained closed during the incident; its dimensions were 108 cm (height) by 90 cm (width) by 30 cm (depth). The platform was positioned against the left wall approximately 154 cm from the front wall. The platform dimensions were approximately 203 cm (length) by 90 cm (width) by 8 cm (height). The mattress on the platform had the dimensions 200 cm (length) by 100 cm (width) by 9.4 cm (height) so the mattress would have been overhanging the side of the platform. There were no electrical sockets in the detention cell.

DEBRIS AND CELL 5 EXAMINATION

16. I understand that a forensic examination of detention cell 5 was not undertaken. No documentation or photographs were made available to me that detailed a logical and thorough examination of the area of burning whilst Mr Jalloh was in situ or after he had been removed from the cell.

17. The investigation group of LKA (Landeskriminalamt) took 9 samples from the detention cell on the 7th January 2005. These were:

Exhibit 1.1: remains of clothing and mattress from beneath the body.

Exhibit 1.2: fire debris from the floor above the head of the body.

Exhibit 1.3: remains of clothing (t-shirt) secured next to the left shoulder of the body.

Exhibit 1.4 fused plastic with a 15 millimetre diameter.

Exhibit 1.5 1 button, 4 metal rivets, 1 zipper slide.

Exhibit 1.6 fire debris swept from custody cell floor.

Exhibit 1.7 cotton swab from leg of table in Doctor's room.

Exhibit 1.8 1 pocket calendar 2003, 1 train schedule, 1 Samsung and 1 brown wallet containing €18:80 all taken from the examination room.

Exhibit 1.9 foam mattress taken from another cell.

I understand that some of the exhibits were taken in aluminium foil bags that were suitable to retain ignitable liquids. Items 1.1 and 1.2 were analysed but no ignitable liquid residues were found. The other exhibits were not analysed for ignitable liquids at this time. I am not aware of the dimensions of the packaging however the images of the debris (LG Magdeburg – Bilder aus der Handakte Pfluger zum Vorgang LKA-Nr.:80/05 Oury Jallow spur 1.1 and 1.2) do not appear to show a particularly large quantity of debris.

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18. On the 10th January 2005 the remains of a partially melted, red plastic “Tokai” gas lighter was found in exhibit 1.1 from beneath the body of Mr Jalloh. A photograph of this was in the report produced by Heikroth, KOK on the 25th February 2005 (33 1/0085/05 Spur1.1.1). The photograph was in black and white however documentation indicated that the lighter had a red plastic body. The lighter in the photograph had a ruler which indicated the remains were approximately 8 centimetres (cm) in length by 2.5 cm in width. The plastic lighter body was partially melted and still attached to the metal shroud. If there had been a detailed examination of the scene then I would have expected, given the size of the object and the remaining red plastic, the lighter to have been identified when exhibit 1.1 was taken. Added to that it seems unlikely that smaller items such as the button, metal rivets and zipper comprising exhibit 1.5 would be identified at the time of seizure, but the lighter missed.
19. The images referenced as LG Magdeburg – Bilder aus der Handakte Pfluger zum Vorgung LKA-Nr.:80/05 Oury Jallow spur 1.1 and 1.2 appear to show the remains of burnt debris. Given the type of debris shown it appears that this debris was taken from beneath the body of Mr Jalloh. Although I do not know when these images were taken there is no indication of the presence of a partially burnt lighter amongst the debris, this is significant if they were taken prior to the packaging of the debris.
20. Assuming that the lighter had been present throughout the fire then in my view for a large amount of the plastic body to survive the lighter must have been afforded some protection from the fire by Mr Jalloh’s body. Considering the patterns of burning to the body this would mean that the lighter was under the right side of the body. When plastics are heated they melt and soften. In the case of the plastic lighter body when affected by heat, it is my experience that it would have become adhered to the item(s) it was in contact with.
21. One hypothesis regarding the ignition of the fire was that it was set by Mr Jalloh using the lighter. If this was the case then it would follow that if the red ‘Tokai’ lighter was the one allegedly used then, after igniting the fire Mr Jalloh proceeded to manoeuvre the lighter under his body and move into the position he was found which was furthest from the tiled wall.

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22. There was no information made available to me that the lighter was identified as belonging to Mr Jalloh. I was told, in a meeting with representatives from the Initiative, that there was no DNA evidence associated with the lighter but a number of unidentified fibres were found. If the lighter had been in the cell then I would have expected some DNA to have survived on it given the degree of protection apparently afforded to it from Mr Jalloh's body.
23. If the items taken from the examination room (exhibit 1.8) belonged to Mr Jalloh then it would appear that he was searched prior to him being restrained in detention cell 5. If he was searched and the lighter is assumed to belong to Mr Jalloh then it would follow that the search procedure was not thorough. The alternative is that the lighter did not belong to Mr Jalloh and he did not have it on his person at the time of the search or the subsequent fire.
24. Remains of partially burnt clothing were found under Mr Jalloh as well as on him at the post mortem. He appeared to be wearing some blue corduroy jeans, a t-shirt and socks. Photographs taken of the clothing when it was examined did not reveal any obvious signs of any adhering red melted plastic. Additionally there was no mention of any such damage in the available documentation.
25. It is also the case that the recovered pieces of mattress cover photographed did not show any signs that a melted red plastic object had been in contact with it. Again the available documentation did not mention the presence of melted red plastic or indeed what, if anything, the lighter had been adhered to.
26. In 2014 Dr Joachim Ryll was asked to analyse the four exhibits (1.1, 1.2, 1.3 and 1.6) for the presence of ignitable liquids. Dr Ryll indicated that the bags had been opened and analysed at various times in the 9 years prior to this examination.
27. To a greater or lesser extent all flammable liquids are volatile and the residues of such liquids can be lost through evaporation. Whether such liquids are subsequently detected during laboratory analysis will depend upon a number of factors including the quantity originally present, the nature of the ignitable liquid, the time delay before packaging and the effectiveness of the recovery method. Therefore, given the numerous analyses and opening of the packaging over the 9 years I would not expect any such ignitable residues to remain. Therefore no conclusions regarding

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whether or not an ignitable liquid could have been used to assist the development of the fire in detention cell 5 can be drawn from this analysis.

28. The mattress, according to the Fire Brigade Institute of Sachsen-Anhalt in July 2008, comprised of a soft foam padded material (PUR-Foam, type of polyethnic foam) and a cover of Polyvinyl Chloride (PVC). The fire behaviour of the foam was such that it could be ignited by a flame and continued to burn after the flame was removed after 5 seconds. The mattress cover however burned after being exposed to a flame for greater than 10 seconds but extinguished when the flame was removed. If a flame was reapplied to the cover it would not reignite as a soot layer developed which inhibited the burning process.
29. Dr Ryll also analysed exhibit 1.1 in order to identify the materials used to manufacture the mattress which Mr Jalloh was lying on in detention cell 5. The mattress was partially burnt however it was comprised of foam and a brown covering. The covering could not be ignited from the textile side. The foam consisted of polyurethane with a small amount of triphenylephosphate as a fire retardant agent. The covering consisted of PET (polythene terephthalate). There was no fire retardant agents found and the proportion of softener was high. As such, even though the covering could not be ignited in his tests, Ryll concluded that the mattress could be easily ignited on its own.
30. The opinion given by Dr Ryll regarding the flammability of the mattress seems at odds with the fire tests carried out by the Fire Brigade Institute in 2008 and his own ignitability tests. It is also known that fire retardant agents degrade over time and therefore this could be the reason for the lack of fire retardants in Dr Ryll's analysis. In addition, the inclusion of a halide in the chemical composition of the cover gives it an inherent degree of fire resistance.

ALARM AND VENTILATION SYSTEMS

31. There was a ventilation system in the detention wing which sucked air in from the outside of the building, exchanging the air in the entire wing. The air flow devices were above the cell doors; the air flow in was 110 m³/h the air flow out was 115 m³/h, so there was a negative pressure in the cell. There were smoke detectors in the ventilation system which closed the ventilators at the time of the fire. There was an

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ionisation smoke detector on the ceiling of the cell; approximately 115 cm from the left wall and 280 cm from the front wall.

32. The fire alarm system in the custody area was monitored in the charge office of the DGL with a control panel which indicated acoustically and optically. The control panel had 2 zones, zone 1 monitored all the detention cells and zone 2 monitored the sanitary room. The detector in the sanitary room was replaced on the 14th September 2004 and the system was tested. The control panel indication zones can be switched on and off with a push button. After activation the audible alarm can be switched off with a further button but the optical LED display is unaffected. The control panel can be reset with a push button after activation. In the case that the cause of the activation is not eliminated a further acoustic and optical display occurs after 10 seconds.
33. A large scale test to determine the activation time of the smoke detector in cell 5 and the ventilation system was tested on the 25th of January 2005 where a piece of mattress measuring 100 cm by 90 cm by 9 cm was ignited. The smoke detector in the cell activated after 56 seconds; the smoke detector in the ventilation system activated after 2:21 minutes and the fan switched off.

ATTENDING OFFICER INFORMATION

34. On the 14th March 2005 Officer Hopfner, an officer working in the DGL at the time of the incident, gave a statement about the incident on the 7th January 2005. She says that she was working at a computer when he heard a hissing sound and then a sloshing noise through an intercom. She informed Herr Schubert of the noises and told him to go down to investigate. At that moment Officer Hopfner heard an alarm sound and saw it was the fire alarm, the time was 12:05. Herr Schubert turned off the alarm as Officer Hopfner called administration. Then the alarm sounded again and Herr Schubert took the keys to the holding area. After Officer Hopfner had contacted Frau Tiesis in administration the ventilation alarm sounded. Officer Hopfner heard a voice over the intercom repeatedly say "Come, untie me", she told the person someone was on their way and tried to calm him down. The person responded with "Fire" and then Officer Hopfner saw on the monitor that Herr Schubert had entered the holding area with another person. When the cell door was opened black smoke

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escaped from the room and Officer Hopfner heard Herr Schubert call “Quick, fire extinguisher”. She saw nothing more on the monitor than black smoke.

35. Officer Hopfner also gave a statement on the 7th January 2005 which indicated that Herr Schubert went into the holding room with Officer Mobes. Officer Hopfner indicated that Mr Jalloh was calling out for someone to “Get me out of these cuffs!” and rattling the cuffs before saying “Get me out of these, there’s a fire”.
36. Mr Andreas Schubert was questioned regarding the incident on the 7th January 2005. He indicated that he was a policeman and started work at 05:30 at Dessau Police Station. Mr Schubert said that Mrs POM Hopfner told him that a male was being brought to the station to answer some questions. Mr Schubert said that the male was under the influence of alcohol and drugs and he refused to have a blood sample taken and so hit his head against a table. He was later restrained with cuffs and gyves. At 12:05 Mr Schubert said he heard a gurgling noise and then the fire alarm sounded. He and POK Mobes went down to the detention cell and upon opening the door were confronted by black smoke. They got a fire extinguisher but could not put the fire out. When Mr Schubert was questioned he said that the male detainee was correctly searched prior to being placed in the detention cell.
37. Mr Gerhard Mobes, a police officer at Dessau Police Station was questioned about his involvement in the fire on the 7th January 2005 in detention cell 5. The first he became aware of the incident was when Herr Schubert asked him to accompany him to the detention area which was in the cellar. Mr Mobes indicated that upon opening a steel door he could smell burning and saw smoke coming from the right hand door. He looked through the spyhole and saw the room was dark. The door to the cell was opened and a black cloud of smoke came out of the room into the corridor. Mr Mobes described the room as being black and full of smoke; after the door had been open he says that he saw flames in the room on the left which he thought about trying to extinguish with a blanket but could not due to the smoke. He then left the detention area.

POTENTIAL CAUSE OF FIRE

38. A smoke detector is designed to activate in the early stages of a fire. An ionisation detector would react quickly to a flaming fire. Tests undertaken after the fire show

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that the ionisation detector activated after 56 seconds of a fire being initiated (presumably by a flaming fire) and that the optical detector in the ventilation system after 2:21 minutes of the fire starting. This seems to fit in with Officer Hopfner's testimony regarding how she became aware of the fire.

39. According to a review carried out by Dr Portz the last person that saw Mr Jalloh alive left detention cell 5 at 11:45am. The fire alarm activated at 12:05
40. The timings information available indicates that the fire was not initiated by a smouldering ignition source such as a lit cigarette. The burning time between when the smoke detector activated (12:05pm according to Officer Hopfner) and when Herr Schubert entered cell 5 appears to be short – a matter of minutes. It takes at least 20 minutes for a smouldering fire to undergo a transition between a smouldering fire and a flaming fire and normally there has to be a change in the conditions in the room such as increased ventilation. The opening of the cell door provided the fire with more oxygen and as such increased the speed of the fire. According to Dr. Portz the last time Mr Jalloh was seen alive was at 11:45am. I understand that the fire service extinguished the fire at 12:35. According to Officer Hopfner the smoke detector activated at 12:05 and tests have shown that the smoke detector would activate after 56 seconds of a fire starting. Therefore the maximum time the fire was burning for was around 30 minutes. If the fire had smouldered for the entirety of its duration then I would expect to see a localised area of burning not the widespread damage seen across the mattress. Flames were seen during the early stages of the fire by Officer Mobes.
41. There was no indication of any electrical items in the cell and certainly there were no such appliances, sockets or installation points near the mattress. The ventilation system and ducts were above the door and the ionisation smoke detector was in the centre of the room in a metal cage. Both the ventilation system and the smoke detector were not above or within the vicinity of the mattress and as such an electrical cause of fire can be ruled out. Dr Portz indicated that the electrical system was in order.
42. Taking into account the patterns of burning, the items present in the detention cell at the time of the fire and the available timings information the only plausible and

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reasonable conclusion regarding the cause of the fire was that it was started by a flame.

43. The analysis undertaken on exhibits 1.1 and 1.2 in 2005 to determine if an ignitable liquid had been used to assist the development of the fire was negative however that does not necessarily mean that one was not used as any residues could have been consumed by the fire.
44. Three post mortems have been conducted on Mr Oury Jalloh's body. The first was by Dr Kleiber at the Institute for Pathology at the Martin Luther University in Halle-Wittenberg on the 7th of January 2005. There were no details in Dr Kleiber's report which indicated that any analysis was carried out on the lung for the detection of ignitable liquids. The second post mortem was carried out by Dr Bratze in Frankfurt am Main on the 31st of March 2005. Mr Jalloh had been frozen as had his organs which were presented in green plastic bags. A headspace analysis of the lungs and brain were carried out but no 'fire accelerants' were found. The third post mortem was carried out by Dr Kauert of the Institute for forensic toxicology. Ignitable liquid analysis of lung tissue did not detect any 'fire accelerants or fire starting substances'.
45. In my opinion no interpretation can be made from the ignitable liquid analyses carried out in the 2nd and 3rd autopsies as it appears that the lungs were not kept in packaging suitable for retaining ignitable liquids as they were presented to Dr Bratze in green plastic bags. As such any such residues which may have been present could have evaporated from the lung tissue prior to the 2nd post mortem.
46. In my view there may be a number of reasons why no ignitable liquid residues were found in the lung tissue. Mr Jalloh may not have breathed in any ignitable liquid residues prior to his death, he may not have been breathing at the time of the fire, any such residues may have evaporated prior to analysis or no ignitable liquid was used to assist the development of the fire.

FIRE TESTS

47. The experiments carried out by Fire Inspector Steinback in 2008 indicated that the mattress cover was difficult to ignite with a flame and if the flame was taken away the fire would self-extinguish. The foam in the mattress however could be readily ignited by a flame in less than 5 seconds.

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48. Ms Sigrid Zeise, when questioned about the cleaning of the cell and mattress, said that the mattress was cleaned with a wet cloth every day and was undamaged prior to the incident otherwise she would have changed it.
49. As the mattress did not have any tears or rips in it then the assumption made by Fire Inspector Steinbach was that the foam had been exposed by the mattress cover seam being unpicked. As the fire started on the side of the mattress against the wall one presumes that the hypothesis would follow that this was the seam that was unpicked by Mr Jalloh. Given that Mr Jalloh's right hand was shackled and raised above the mattress it is difficult to know how much mobility he would have had to unpick a mattress seam. There were protected areas around the wrists of Mr Jalloh which indicated that the cuffs had been tightly applied, thus potentially restricting his hand movement.
50. Fire Inspector Steinbach conducted a number of tests where a life sized dummy was placed on a mattress. The tests appeared to recreate the conditions in detention cell 5 at the time of the fire. Fire Inspector Steinbach indicated that the mattress could be ignited and continued to burn if the foam was exposed with an opening greater than 6-8cm². Fire Inspector Steinbach was of the opinion that the mattress could only be ignited if there were foam surfaces because of the behaviour of the cover in a fire. Fire Inspector Steinbach also ignited clothing on the mattress however this did not ignite the mattress. Therefore the experiments performed by Fire Inspector Steinbach indicated that if the mattress was intact, without any exposed foam, a fire resulting from the ignition of clothing would not destroy the mattress and cause the fire damage seen in detention cell 5. Additionally for the fire to start and then spread across the whole mattress there must be areas of exposed foam. Therefore considering a fire started by Mr Jalloh with a flame, he would first have to make a hole in the mattress cover in excess of 6-8cm² and then apply a flame to it and then proceed to further rip the mattress to expose more foam to allow the fire to spread. It would seem unlikely that Mr Jalloh would be able to cause this much damage to the mattress considering his hands were shackled and a guard was checking on him every 30 minutes. There was no mention of his guards noticing the mattress being damaged by Mr Jalloh.

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51. Mr Maksim Smirnou conducted a series of tests in 2013 using ten similar mattresses which consisted of PU foam covered with a Polyvinyl Chloride skin. Although the room used for the tests was recreated to be similar to detention cell 5 there were some variables. The size of the room was slightly different and the room did not have a ventilation system. Mr Smirnou also used clothed pig carcasses, without their internal organs, to replicate a clothed human body lying on the mattress.
52. Mr Smirnou conducted a series of tests which applied a flame to the mattress which had cuts in the cover. None of the tests reproduced the extent of the damage seen to the mattress in detention cell 5 and the majority of the mattress was undamaged. Additionally there was only slight damage to the pig's skin.
53. Mr Smirnou concluded that the heat release rate of a PU foam mattress was not sufficient to enable a fire to affect the entire mattress such as that seen in detention cell 5.
54. Mr Smirnou proceeded to use varying quantities and types of ignitable liquids namely Ethanol, Barbeque Lighter Fluid and Petrol to assist the development of the fire on the mattress. Mr Smirnou concluded that the test which most closely corresponded to the fire damage seen to Mr Jalloh and the mattress in detention cell 5 was conducted using 2 litres of petrol. 1 litre of petrol was poured over an area of PU foam where the cover had been cut, the other litre was poured over the pig's body.
55. The findings of Mr Smirnou seemed to correspond in part with Fire Inspector Steinbach's such that the mattress is difficult to ignite without exposing the foam filling.

SUMMARY AND RECOMMENDATIONS

56. In my opinion, the fire at Dessau Police Station in detention cell 5 at 12:05pm on the 7th of January 2005 started on or around the mattress and was the result of a flame ignition.
57. I have considered and excluded cigarettes and electrical causes as potential causes of the fire.

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58. The lighter found in exhibit 1.1 may have been present in the cell however the evidence from Officer Schubert that Mr Jalloh was correctly searched prior to being placed in detention cell 5, that the lighter was not seen at the time of evidence collection when other smaller items were, that there was no DNA from Mr Jalloh associated with the lighter and the lighter was relatively undamaged indicated that it was more likely that this lighter had not been in the cell at the time of the incident.
59. Fire Inspector Steinbach did not use any ignitable liquids in his tests. The fire tests without using ignitable liquids carried out by Mr Smirnou and Fire Inspector Steinbach's fire tests did not replicate the extent of the damage which resulted from the fire in detention cell 5 on the 7th of January 2005.
60. Cutting the mattress several times brought the fire damage closer to the original scene. However there is evidence that the mattress was undamaged prior to use and no evidence that it was damaged whilst in use by Mr Jalloh.
61. Therefore, in my view, any fire test undertaken to try and replicate the damage ought to avoid making cuts to the mattress.
62. Taking into account all the variables attributed to the fire tests carried out by Mr Smirnou it would however appear that the test using 2 litres of petrol most closely matched the damage in cell 5 on the 7th January 2005.
63. Although no ignitable liquids have been found an absence of evidence is not evidence of absence. As such, in my view, there are a number of plausible explanations for the absence of ignitable liquids residues on the items analysed after the incident and therefore in my opinion it is entirely possible that an ignitable liquid could be used to assist the development of the fire in detention cell 5 on the 7th of January 2005.
64. Given the information made available to me it is my view, that it is more likely that a third party ignited the fire. Whether that was by the destruction and ignition of the mattress directly in multiple areas or with the addition of an ignitable liquid.
65. Further testing with greater defined criteria would be of use to potentially determine the possible use of ignitable liquids. I would recommend that the set up was similar to that used by Mr Smirnou in terms of room size, clothed pigs and method. However

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the room door should be opened approximately 5 minutes after ignition and then allowed to burn for the full 30 minutes as per the arrival of the fire service. These tests should involve ignitable liquids on mattresses with and without cuts.

These views and opinions are based on my examination of the information provided. I am willing to review them if additional material or different circumstances are brought to my attention.

Signed:

Dated 15th June 2015

Mr Iain Peck B.Sc, M.Sc
Prometheus Forensic Services Ltd.

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APPENDIX A

Fire development in general

Flaming fires

1. When a fire starts to burn, flames will rise from it and will ignite any combustible material with which they come into contact. By contrast, the horizontal development of a fire is governed principally by the proximity of the burning object to other combustible materials and the amount of heat radiated from the existing fire. In consequence, flaming fires tend to burn predominately upwards and only slowly outwards.
2. Fires develop rapidly where there is a concentration of fuel and free access to air. In such a situation, the greatest degree of burning tends to reflect where the fire started. For example, the graduation in char as shown by an extinguished match depicts where the flaming started and how far down the match the fire progressed.
3. Subsequent to the initial flaming of a fire in a room, the buoyant hot smoke and gases from the fire rise to the highest level, i.e. against the ceiling, and form a layer of quickly increasing depth and temperature down from that level. If this layer of hot gases reaches temperatures of about 600°C, the heat radiated downwards can cause any combustible materials below to heat up and burst into flame, even those materials in the same room but possibly well removed from where the fire started. This phenomenon, which is characteristic of compartment fires, is known as flashover. From the time when flashover occurs, most exposed combustible material in the room will start to burn and thereby contribute to the fire. In this case flashover did not occur.
4. On the other hand if the air supply to a fire is restricted significantly, the fire is termed “ventilation controlled” and it is not uncommon in dwellings for a flaming fire to die down and result in a smouldering one under these conditions. In this case there has been ample supply of air as the main bedroom did not have a door on it and therefore the fire had not been “ventilation controlled”.

Smouldering fires

The death of Mr Oury Jalloh

5. In contrast to a flaming fire, a smouldering fire is one where there is no flame, for example, as with a lighted cigarette. Substances composed of cellulose, such as cotton fibres, paper, cardboard, sawdust and wood, amongst other things, can smoulder for considerable periods of time in the most favourable of circumstances; hours if not days in some instances. Also certain textile fabrics and some foam materials can smoulder. In scientific terms, any substance which can produce a rigid char (essentially carbon) is capable of smouldering. Such fires produce a lot of smoke.
6. Smouldering fires may be initiated in such substances by another smouldering item such as a cigarette, or more exceptionally by a flame, a spark or by contact with a hot surface. Smouldering may self-extinguish, continue or break out into flame. For the smouldering to continue, there must be an adequate supply of the smouldering substance. If a smouldering fire breaks out into flaming, the time taken for this to occur depends on a number of factors but it can be as little as 20 minutes on bedding or in upholstered furniture such as armchairs or sofas. Typically however, periods of one to two hours are required. Furthermore, for the few minutes prior to flaming, the smouldering fire will invariably produce copious amounts of smoke.
7. There is very little information in the scientific literature regarding the rate at which different materials smoulder. In addition, it is well known that any particular material can smoulder at different rates at different times. The rate of smouldering depends critically on the precise make-up of the material involved, its geometry and the environment. The result of all this is that for all practical purposes it is impossible to tell for how long a smouldering fire had been alight.

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APPENDIX B

List of documents made available to me at the time of my case review:

- SH 3 Rechtsmedizin (1) Kleiber 2005 dt
- Images VTS_01_1.VOB.Standbild001 – 003 and 005 (undated)
- Report by Univ. Prof. Dr. med Hansjurgen Bratze dated 12/4/2005
- Exhibits list – Landeskriminalamt (LKA) Sachsen - Anhalt – Dezernat 33.1 – Az:33.1/0085/2005 (undated)
- Hopfner Skizzle Cell (undated)
- Report of Prof. Dr. G. Kauert dated 14/9/2005
- Report of Prof. Dr. med Kleiber dated 10/1/2005
- Report of LKA – Sachsen, Official Expertise dated 9/2/2005 (concerning the fire alarm and ventilation system)
- Kriminaltechnische Akte spur 1.1 und 1.2 p10-17 und protokoll (undated)
- Fire investigation report by Mr Maksim Smirnou dated 2013
- Officer Hopfner's statements dated 7/1/2005 and 14/3/2005
- Dr. Portz report (undated)
- Report of Prof. Dr. Bohnert dated December 2011
- Report of Dr Ryll dated 2014
- Statement of Ms Zeise dated 22/2/2005
- Steinbach video's dated 22/6/2008
- Report by Dr. Kauert and Dr. Bohnert dated April 2015
- Questioning of Herr Schubert and Herr Mobes dated 7/1/2005
- Undated videos showing:
 - Fire test, Institute of Fire Brigade IdF und LKA in cell 5
 - Movement on mattress
 - Steinbach test with experimental doll_2
 - Steinbach test with experimental doll
 - VTS_01_1 (Dessau detention centre and cell 5 after the fire)