Regulation 28: Prevention of Future Deaths report

Bobby LEE otherwise known as Kim Sing Lee (died 6 July 2023)

	REGULATION 28 REPORT TO PREVENT FUTURE DEATHS **THIS REPORT IS BEING SENT TO:** [redacted] Chief Executive Officer Office for Product Safety & Standards Cannon House 18 The Priory Queensway Birmingham B4 6BS
1	**CORONER** I am Ian Potter, assistant coroner, for the coroner area of Inner North London.
2	**CORONER'S LEGAL POWERS** I make this report under paragraph 7, Schedule 5, of the Coroners and Justice Act 2009 and Regulations 28 and 29 of the Coroners (Investigations) Regulations 2013.
3	**INVESTIGATION and INQUEST** On 31 July 2023, an investigation was commenced into the death of BOBBY LEE, then aged 74 years. The investigation concluded at the end of an inquest, heard by me, on 19 December 2023. The conclusion of the inquest was accidental death, the medical cause of death being: 1a smoke inhalation, severe burn injuries 2 frailty, severe coronary artery stenosis and atherosclerosis, hypertension, severe chronic kidney disease, type 2 diabetes mellitus.
4	**CIRCUMSTANCES OF THE DEATH** Mr Lee died at home on 6 July 2023 from the effects of smoke inhalation and severe burn injuries, resulting from a house fire that commenced at approximately 06:56 that morning. The fire was found to have been caused by the over-charging of a lithium-ion e-bike battery that had no battery management system in situ.

	The e-bike from which the battery came, was owned by another member of the household. The bicycle had started off as a regular mountain bike, but was subsequently fitted with a 'conversion kit' which converted the bicycle into an e-bike. The e-bike was purchased second-hand, without a charger. A charger was subsequently purchased from an online marketplace. I found on the evidence, which included that of a London Fire Brigade Fire Investigation Officer (whose evidence included input from the Chief Scientific Adviser at the Fire Science Department, who had examined the remains of the converted e-bike, the lithium-ion battery and the charger) that the fire was started by the over-charging of the lithium-ion battery, using a charger which was not suitable for the battery in that the charger had a substantially different voltage rating to the battery. In addition, the battery was not fitted with a battery management system aimed at reducing the risk of over-charging. This set of circumstances led to thermal runaway and a catastrophic failure of the lithium-ion battery. Despite attempts from family members to assist Mr Lee's evacuation from his ground floor bedroom, it was not possible to secure his safe evacuation from the premises. Mr Lee suffered severe burn injuries and the effects of the inhalation of toxic smoke and died as a result.
5	**CORONER'S CONCERNS** During the course of the inquest the evidence revealed matters giving rise to concern. In my opinion, there is a risk that future deaths could occur unless action is taken. In the circumstances, it is my statutory duty to report to you. The **MATTERS OF CONCERN** are as follows: The evidence, in particular from the London Fire Brigade's Fire Investigation Team, revealed that: • Mr Lee's death was one of three in London in 2023 attributable to fire started by faulty lithium-ion batteries and/or chargers for e-bikes or e-scooters. • The number of fires in London attributed to electric powered personal vehicles (e-bikes or e-scooters) has risen significantly and consistently in the past four years (26 fires in 2020; 74 fires in 2021; 116 fires in 2022; and 169 fires up to mid-December 2023). • That lithium-ion batteries sold as part of, so-called e-bike conversion kits, tend to be of a significantly inferior quality and construction when compared to the battery packs manufactured and installed in purpose-built e-bikes.

- Lithium-ion batteries sold as part of e-bike conversion kits are regularly sold/supplied without a charger, thereby increasing the risk of an unsuitable charger being purchased and used.

- Chargers for sale on online marketplaces, in particular, regularly fail to meet appropriate standards. In this case, the charger purported to carry the European 'CE' mark, which should be an indication that the product conforms to European health, safety and environmental protection standards; however, the Fire Investigation Officer noted that the mark was slightly different and therefore not genuine. It was used instead to denote 'Chinese Export'.

- The presence of universal charging connectors across batteries of different voltages means that there is a significant risk that over-rated chargers can be inadvertently connected to lower power batteries, which was the case in the fire that led to Mr Lee's death.

- There is currently no British or European (e.g. BSI or PAS) standard specific to e-bike conversion kits and/or chargers and consequently:

    - It is relatively easy for people to buy, particularly from online marketplaces, e-bike conversion kits and/or lithium-ion batteries that are not of sufficient quality or otherwise not of an appropriate standard to charge safely.

    - There is an increased risk of people mixing and matching lithium-ion batteries with chargers that carry a different voltage rating.

- When a lithium-ion battery is charged using a charger with a different voltage rating, this can lead to thermal runaway and catastrophic failure of the battery – a build up of heat, failure of one of the cells within the battery, followed by a chain reaction as the remaining cells fail, all of which can happen very quickly and explosively with the emission of sparks and toxic, flammable vapours.

I am aware, from past 'prevention of future death' reports of a similar nature that the Office for Product Safety and Standards (OPSS) has planned to commission the British Standards Institute (BSI) to prepare a fast-track standard to cover technical and safety standards for e-bike conversion kits to help manufacturers to comply with existing safety regulations. However, to my knowledge this piece of work has not yet been completed.

In addition to the above, I am also aware that the OPSS established a multi-disciplinary safety study to understand data and evidence of risks in this area, as well as commissioning new research into battery safety, including

	compatibility issues, from Warwick Manufacturing Group (part of Warwick University). However, I do not know the progress or timescales involved in this review and research. It is clear to me though that there is a substantial existing, ongoing and future risk of further deaths while it continues to be the case that there are no, or insufficient, controls and/or standards governing the sale in the UK of lithium-ion batteries and chargers for electric powered personal vehicles and e-bike conversion kits. It is my understanding that the OPSS is taking the lead and has the power to introduce such standards, which is the basis upon which this report is being sent to you. Insofar as that power may lie elsewhere, or other individuals and/or organisations may need to have input into the introduction of such a standard, I would request that you share this report with those individuals and/or organisations.
6	**ACTION SHOULD BE TAKEN** In my opinion action should be taken to prevent future deaths and I believe you have the power to take such action.
7	**YOUR RESPONSE** You are under a duty to respond to this report within 56 days of the date of this report, namely by 29 February 2024. I, the coroner, may extend the period. Your response must contain details of action taken or proposed to be taken, setting out the timetable for action. Otherwise, you must explain why no action is proposed.
8	**COPIES and PUBLICATION** I have sent a copy of my report to the Chief Coroner and to the following Interested Person: (a) [redacted] (family member). (b) [redacted] (London Fire Brigade) I am also under a duty to send the Chief Coroner a copy of your response. The Chief Coroner may publish either or both in a complete or redacted or summary form. He may send a copy of this report to any person who he believes may find it useful or of interest. You may make representations to me, the coroner, at the time of your response, about the release or the publication of your response by the Chief Coroner.
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	Ian Potter **HM Assistant Coroner, Inner North London** **4 January 2024**