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Introduction: Fire damaged scenes can be described as looking at a charred and blackened jig-saw, where each party has a piece of the puzzle, but none has the overall picture. The investigation into fires of suspicious or deliberate origin and incidence of fatal and serious injury fires in the UK is led by the police. However aspects of the investigation can fall through the gaps of professional responsibilities between representatives of the police service, fire and rescue services and forensic fire investigators.

This poster promotes taking a positive team approach towards identifying, preserving, documenting, securing and retrieving of potential forensic evidence from even the most destructive of fire scenes. This can include the identification and recovery of finger-marks, DNA, blood and other body fluids, weapons, ammunition, clothing, electrical items, drug paraphernalia, incendiary devices, ignitable liquids and containers etc. etc.

The effects of fire, heat and smoke, plus suppression, rescue, ventilation and turning over activities, can all damage or destroy much of the physical evidence. To the Senior Investigating Officer (SIO) and scene examiners the challenge to secure vital evidence can be daunting. However, experienced practitioners will recognise that the behaviour of fire can also create its own evidence, for example abnormal fire patterns, which can be created by ignitable liquids, trailers and incendiary devices.

Background and Research Methodology: For over a decade numerous fire training and associated forensic research projects have been carried out at the Gardiner Associates facility, which was originally sited at the Ministry of Defence Police HQ in Essex. These projects have involved a number of Universities, representatives of the Forensic Science Service, private forensic providers, fire and rescue service and police personnel. Since relocation to a neighbouring site (Phoenix Heights) Gardiner Associates Training and Research (GATR) and Gardiner Fire Investigation (GFI) have been continuing to set fires 'in the name of science'.

The Phoenix Heights fire/crime scene compartments are constructed of building materials currently in common use e.g. external building blocks on a concrete base, walls and ceilings lined with plaster boards on timber studs with raised timber floors. The single storey compartments are electrically energised and fitted with modern fire suppression systems.

The rooms are furnished as lounges, bedrooms, bedsits, offices etc. The contents include timber tables, chairs, cabinets, soft furnishings made of a variety of materials e.g. combustion and non-combustion modified foam. Also included are bedding materials, plastics, electrical items and other scene dressings appropriate to the scenarios.

The compartments are photographed pre and post fire and filmed from the time of ignition to suppression. Fire behaviour is monitored remotely by thermocouples placed at ceiling, mid-way and floor heights, which enables realistic time temperature graphs to be produced.

The fires, which can reach temperatures of above 1000C, are set by various methods replicating both accidental and deliberate scenarios. Ignitable liquids can be introduced and the signs of forced entry replicated. Purpose built manikins or other realistic means of representing the position of victims of fire and/or other injuries sustained can be utilised as and when required.



Phoenix Heights Furnished Lounge Filming and Recording of Time Temperatures

For training purposes the fire damaged scenes are examined and documented by small multi-agency syndicates e.g. fire and rescue service investigators, crime scene examiners, forensic fire investigators and other professionals. The syndicates are required to adopt a systematic methodology to enable them to: determine the origin and cause; evaluate the behaviour of fire; assess the behaviour of persons involved in the fire; produce a report and statements; qualify their conclusions and present their findings to their peers in a mock courtroom.

Physical evidence retrieved from the compartments is preserved and packaged in order that it can be examined in sterile areas on site or, in the case of formal research projects, taken to independent laboratories.



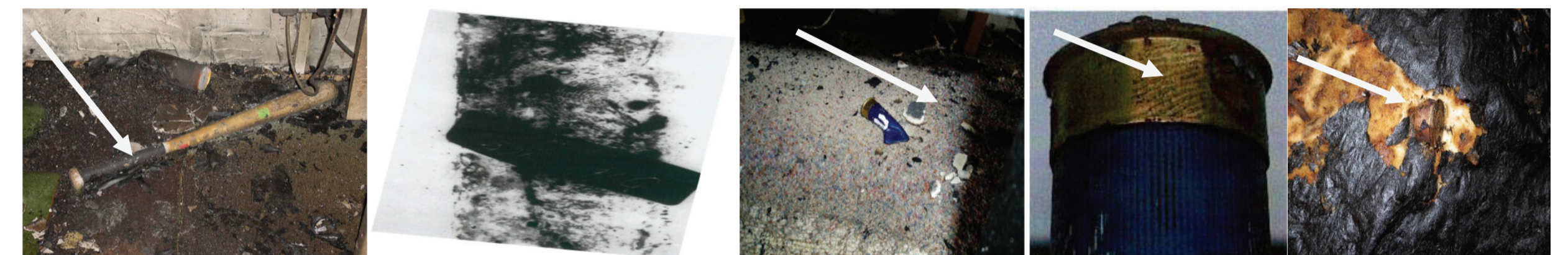
Fire scene examination Recovery and examination of electrical items Fatal fire manikin



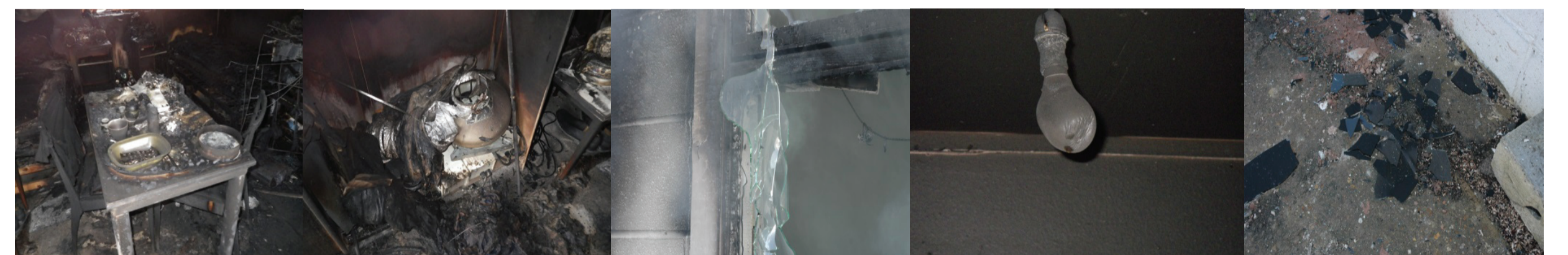
Infant fatality – matches - DNA on bottles Rape, murder and arson – Evidence of condom, cigarettes, cans etc



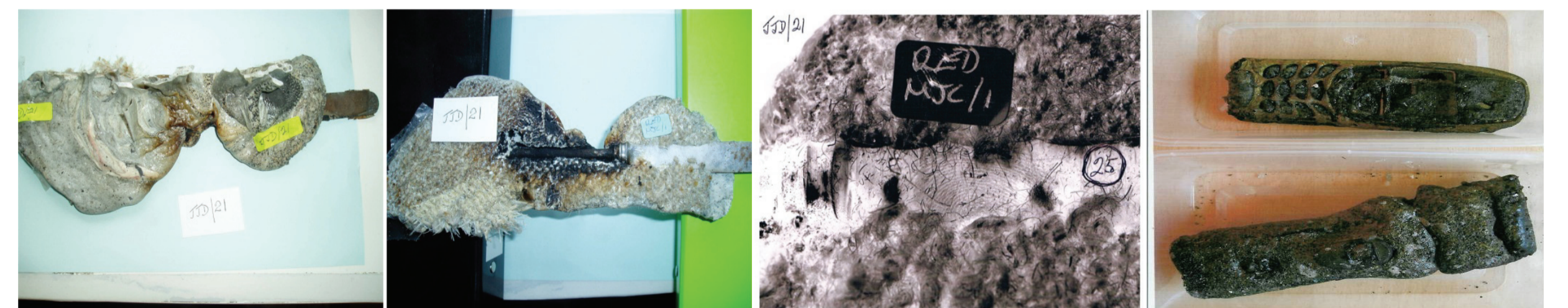
Assault impact mark - blood on wall - fire Murder scene - blood-stained hammer - petrol bomb - fire



Assault - weapon - baseball bat - finger mark on handle Murder scene - shotgun cartridges - finger mark recovery



Drug Factories –Trace Evidence Glass and the effects of Heat and Smoke



Knife on carpet in melted plastic bin - finger mark DNA recovery from shaver and mobile phone- protected areas

Conclusions: Research projects such as those illustrated demonstrate that even the most fragile and minute pieces of forensic trace evidence may survive the combined effects of the most intense and complex fires.

Lessons learnt from such projects can be dovetailed into working practices and thereby generate a greater understanding and positive attitude when undertaking the examination of fire scenes.

In the future GATR and GFI intends to continue setting compartment fires at Phoenix Heights and invites other interested parties to submit research proposals in this field which could further advance the knowledge and understanding of the fire investigation community.

Further enquiries see: www.gardinerassociates.com