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(subject to editorial corrections)**

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IN THE CROWN COURT SITTING IN NORTHERN IRELAND

Bill No: 341/05

THE QUEEN

-v-

SEAN HOEY

WEIR J

Introduction

[1] In this Bill the accused is charged with 58 counts related to the alleged offences of murder, conspiracy to murder, causing explosions, conspiracy to cause explosions and possession of explosive substances with intent to endanger life or cause serious damage to property. They arise from thirteen bomb and mortar attacks, attempts at such attacks and the finding of unexploded devices that began on 24 March 1998 and included the infamous car bomb explosion that destroyed much of the shopping centre of Omagh on the afternoon of Saturday, 15 August 1998 with the appalling consequence that twenty-nine members of the public, including a lady pregnant with twins which did not survive, were killed and hundreds of others were injured, many gravely, leaving permanent and widespread physical and psychological scars. The town centre was destroyed. This huge explosion was among the very worst of the numerous terrible events of that recent thirty-year violent period of Northern Ireland history sometimes euphemistically referred to as "the Troubles". The prosecution contended, and there seems little doubt, that those responsible for all these incidents were so-called republicans who did not accept the implications of the Good Friday Agreement for the continuation of their terrorist campaign. I shall briefly describe each of the thirteen incidents and the charges relating to them against the accused.

1. Mortar Attack on G30 Army Tower at Crossmaglen on 24 March 1998

[2] An explosion was heard in the area adjacent to the tower and in the subsequent search twin mortar tubes mounted upon a base plate were discovered. It was found that both mortars had successfully fired but fallen short of the Tower which was their presumed target. The timer power unit ("TPU") was found to be comprised of a "Coupatan" brand two-hour timer and two toggle isolating switches mounted on a plastic lunch box with the power provided by batteries housed within the box and with wires leading from holes in the box for connection to the detonator. The particular characteristics of this type of TPU distinguished it from its predecessors and successors so that it became known as a "Mark 19". TPUs of this type are shown to have been used in eleven of the thirteen incidents.

[3] Subsequent enquiries revealed that an order had been placed in England in January 1997 for 480 "Coupatan" timers which were manufactured in France and supplied with their week of manufacture - 99710 - signifying the tenth week of 1997, stamped upon them. Unsurprisingly the details of the person who ordered the timers proved to be fictitious. Timers from the same batch were also recovered in devices found in London and the Republic of Ireland during the period 3 March to 10 July 1998.

[4] The accused is charged in Count 44 with Conspiracy to Murder a member or members of the security forces, in Count 45 with Causing an Explosion likely to endanger life or cause serious injury to property and in Count 46 with Possession of an Explosive Substance with intent to endanger life or cause serious injury to property.

2. Mortar Attack on Forkhill Army/RUC Base on 24 March 1998

[5] On the same day as Incident 1 this second mortar attack was launched. One mortar exploded within the compound but fortunately did not strike any person or building. The follow up search revealed two mortar base plates each with two tubes. Each pair had its own TPU, one of which was a Mark 19 and the other of different construction.

[6] The accused is charged in Count 47 with conspiracy to Murder, in Count 48 with Causing an Explosion and in Count 49 with Possession of an Explosive Substance with intent.

3. Hoax Device on Railway Line at Red Bridge, Newry on 3 April 1998

[7] A railway worker observed a suspicious item on the Belfast to Dublin railway line. When examined the item was found to be a hoax device consisting of a paint bucket filled with car fillers and a Mark 19 TPU.

[8] The accused is charged with Possession of an Explosive Substance namely the TPU.

4. Car Bomb placed at Market Square, Lisburn on 30 April 1998

[9] Between 1038 and 1109 ten bomb warnings were received, initially that a 600lb car bomb had been left outside the Bank of Ireland in Market Street in a blue Toyota Corolla import model. The recognised code words "Martha Pope" associated with dissident republicans was given. The car was in fact on the other side of Market Square about 125 feet from the bank and, as a later call mentioned, outside a disused butcher's shop where it was quickly found by Police. The area was cleared and the device disabled by controlled explosions. On examination it was found to comprise a Mark 19 TPU in the driver's footwell with wires leading from it to a booster tube in the boot which was embedded in a large quantity of improvised explosive material, the characteristic construction of the various car bombs in this case.

[10] The accused is charged in Count 33 with Conspiracy to Cause an Explosion and in Count 34 with Possession of an Explosive Substance with intent.

5. Mortar Attack on Belleek RUC Station on 9 May 1998

[11] Police received reports that there were suspicious tubes in the grounds of a hotel near the police station. On going there they found a mortar base plate with two tubes facing towards the station. While the area was being cleared there was an explosion at the base plate and a mortar launched which fell short of the station so that in the result no-one was injured. On examination the TPU was found to be a Mark 19.

[12] The accused is charged in Count 51 with Conspiracy to Murder, in Count 52 with Causing an Explosion and in Count 53 with Possession of an Explosive Substance with intent.

6. Car Bomb placed near Armagh RUC Station on 16 May 1998

[13] A Toyota car was seen by Police parked at Newry Road, Armagh close to the police station. A check on the car revealed that it had false number plates and a TPU was seen in the driver's footwell. The area was cleared. At 2229 a bomb warning was received by the Samaritans using the code words "Martha Pope" and at 2232 the Fire Brigade received a warning. A controlled explosion was carried out and a subsequent examination showed that the bomb was of a similar type to Lisburn with a Mark 19 TPU and about 500lbs of improvised explosive material.

[14] The accused is charged in Count 35 with Conspiracy to Cause an Explosion and in Count 36 with Possession of an Explosive Substance with intent.

7. Placing of a bomb on the railway line at Finaghy on 24 May 1998

[15] Two people were seen acting suspiciously on the line under the railway bridge and a suspect device was found there. It included the by now familiar Mark 19 TPU. While the area was being cleared the device partially exploded causing minor damage to the line but no injuries.

[16] The accused is charged in Count 57 with Causing an Explosion and in Count 55 with Possession of an Explosive Substance with intent

8. Leaving a trailer bomb on a minor road near Blackwatertown Road on or about 9 July 1998

[17] Following a call to a television station that a device had been left in the Blackwatertown area, a car trailer was found on a minor road containing 1400lbs of improvised explosive material with two booster tubes. Again a Mark 19 TPU was found but this time it was not connected to the explosives but was lying among bushes some 5 to 10 metres from the trailer where it appeared to have been thrown.

[18] The accused is charged in Count 37 with Conspiracy to Murder, in Count 38 with Conspiracy to Cause an Explosion and in Count 39 with Possession of an Explosive Substance with Intent. At the conclusion of the prosecution case I ruled that he had no case to answer on Count 38 and found him not guilty on that charge.

9. Car Bomb placed at Newry Courthouse on 13 July 1998

[19] A car was abandoned at Newry Courthouse and four warnings of a bomb outside the Courthouse were telephoned. The area was cleared and a controlled explosion carried out. The follow up examination revealed the familiar format of a boot filled with improvised explosive and a Mark 19 TPU in the driver's footwell. The TPU had a modification from those previously seen, designed to prevent accidental deployment of the toggle switches.

[20] The accused is charged in Count 40 with Conspiracy to Cause an Explosion and in Count 41 with Possession of an Explosive Substance with intent.

10. Mortar Attack on Corry Square RUC Station Newry on 21 July 1998

[21] Police received a report that a van had been abandoned on ground to the rear of the police station. Some five minutes later a mortar fired from the

van but landed only a few yards away and outside the station. Fortunately it did not explode. The attack was later claimed using recognised code words. On examination the device was found to consist of an improvised mortar fired by using the Mark 19 TPU. However this particular device had been modified by the introduction of a nail and dowel to physically prevent the timer from clicking back into the "on" position until shortly after the dowel had been removed, thereby allowing for a safe short delay between arming and firing.

[22] The accused is charged in Count 56 with Conspiracy to Murder, in Count 57 with Causing an Explosion and in Count 58 with Possession of an Explosive Substance with intent.

11. Car Bomb at Newry Street, Banbridge on 1 August 1998

[23] Three warnings were received that there was a bomb in a red Cavalier car outside premises described as "the Ranch" or "Ranchhouse" in Newry Street, Banbridge. The code words "Marjorie Pope" were given in two of the warnings. The police began to evacuate the area but before that could be completed the car exploded. Fortunately, while injuries were sustained, they were not, in relative terms, very serious but great destruction of property was caused over a wide area. As a result of the explosion it was impossible to recover any part of the explosive or explosive device so that it cannot be said in this case whether the design and composition of the bomb or any TPU was as that in the other incidents.

[24] The accused is charged in Count 32 with Causing an Explosion. In the event the Prosecution called no evidence to connect him with the charge and at the conclusion of the prosecution case I ruled, the prosecution not objecting, that the accused had no case to answer on that charge and found him not guilty.

12. Car Bomb at Market Street, Omagh on 15 August 1998.

[25] At 1429 the first warning, traced to a phone box many miles away in Forkhill, County Armagh, was received by UTV: "Bomb Courthouse Omagh Main Street, 500 lbs explosion 30 minutes" and the codewords "Martha Pope" were given. At 1431 a second warning was given from another distant phone box, this time at Newtownhamilton, also in County Armagh: "Martha Pope 15 minutes bomb Omagh Town "and at the same time a third warning from the first phone box at Forkhill was given to the Samaritans: "Am I through to Omagh? This is a bomb warning. It is going to go off in the centre of Omagh in 30 minutes time. Martha Pope. Main Street about 200 yards from the Courthouse".

[26] Omagh is the county town of Tyrone and was as is usual, and especially so on a summer Saturday afternoon, thronged with visitors and shoppers. The small number of Police on duty around and near the town were alerted and came quickly to the scene but faced a huge task in trying to evacuate and seal off the area, not least because the main part of Omagh town centre is a long linear street lined with many shops and stretching some hundreds of yards up from Bridge Street along Market Street into High Street to the Courthouse with vehicle and pedestrian thoroughfares running off to either side along its length. Importantly, the warnings gave no description of the car in which the bomb was contained and there were very many vehicles parked by the roadside so that any that was unoccupied was a possible candidate. It was therefore impossible for Police to focus on a known vehicle and work from it to move people away in all directions to safety nor was there any ascertained point of danger they could point to so as to encourage people to evacuate swiftly. At 1504, while many people were still in Market Street, the bomb exploded with the appalling consequences that I have earlier summarised. The resulting scene was one of unspeakable carnage and utter devastation. Several people later remembered seeing the car, a Cavalier, either being driven towards or parking at Market Street. One saw two men in the front of it as it drove ahead of him while another saw a man leaving it when it had parked. Most seem to agree that it was left in its position at approximately 14.20. That position was later measured as being approximately 365 yards from the Courthouse.

[27] The accused is charged in Counts 1 to 29 with the Murder of those killed by the explosion, in Count 30 with Causing an Explosion and in Count 31 with Possession of an Explosive Substance with intent.

13. Discovery of abandoned Mortar Bomb at Altmore Forest on 12 April 2001

[28] As a result of a report the Police discovered a Hiace van abandoned on a remote country road beside a forest. The van contained a base plate with mortar tube, a mortar packed with 90 kilograms of explosive and a TPU of a different design from the Mark 19. Everything required to fire the mortar was present and although there was no identifiable target in the vicinity of the place where it was found the prosecution reasonably contend that it was intended for use in a lethal attack against some security installation since that is the only form of target for which such devices have over the years been used.

[29] The accused is charged in Count 42 with Conspiracy to Murder and in Count 43 with Possession of an Explosive Substance with intent.

The Nature of the Prosecution Case against the accused

[30] The charges are based upon what the prosecution say are a number of strands that taken together lead to the conclusion that the accused was involved in each of the 12 remaining incidents to the extent necessary to support each charge. Put shortly, they say that those strands are as follows:

1. An examination of the manufacture of the Mark 19 TPUs that are known to have been used in eleven of the first twelve incidents and others found in other incidents tends to show that those used in the twelve had been made by the same person because of consistent features of their design and manufacture.
2. Fibres were recovered from melted glue used to secure components within the housing of several of the TPUs. These were consistent with having come from knitted gloves suggesting that similar gloves were worn by whoever assembled the TPUs. At the accused's house there was a mobile home. When it was searched in 2003 some fibre samples were recovered. Four fibres found on the Lisburn device are said to be indistinguishable from five fibres recovered from the mobile home. No knitted gloves were recovered. It is said that these fibres provide weak support for the proposition that the Lisburn TPU and items from that mobile home have been in contact with the same garment or fabric although it is conceded that this finding is not of itself strong.
3. DNA examination of a type known as "Low Copy Number" was undertaken subsequent to the events of 1998/9 upon quite a number of the items recovered although at the time that they were being recovered the possibility of their being examined for DNA was not considered by those effecting their recovery, storage and transmission. It is said that the result of DNA examination is to show that the accused was in contact with parts of the devices from Lisburn, Armagh, Blackwatertown Road and Altmore Forest.

The Prosecution submit that the combination of those strands produces the result that the accused can be shown to be involved in the construction of the twelve devices and thereby an essential part of the conspiracy to cause each of the remaining incidents charged. I shall examine each of the strands in turn.

Prosecution strand 1 - Alleged Common authorship of the Mark 19 TPUs

[31] This evidence was given by Mr Dennis McAuley, a Senior Scientific Officer at Forensic Science Northern Ireland ("FSNI"). It related to the examination by him of the eleven Mark 19 TPUs from the present incidents, another found in London and another in the Republic of Ireland. He also examined the photographs and case notes of the Garda Siochana relating to

two others found in the Republic. His examinations were acknowledged by all to be lengthy, painstaking and comprehensive and were directed to assessing the similarity or otherwise of the construction of the TPU's in order to seek to say whether all or any may have been constructed by the same person. To that end he examined:

1. The identification of the components used.
2. How and where the major components were mounted and their proximity to each other.
3. The sequence of components in the electrical circuit.
4. The physical characteristics and configuration of the lengths of wiring used in the circuit.
5. Whether any of the soldered connections displayed "characteristic workmanship".
6. Whether any physical matches existed between materials in or attached to one unit and those in or attached to another such as tape ends, sections of plastic conduit or terminal blocks.

[32] As a result of his admirably thorough and detailed examination Mr McAuley established many points of similarity in the nature and construction of the Mark 19 Timers. He also found points of dissimilarity. I intend no disrespect to his exceptional industry by not setting them out here *in extenso*. In summary, he found that they were all contained within "Addis" or similar plastic lunch boxes, where there was enough of them remaining following explosion or ATO action they were seen to have similarly-placed holes melted in them to accommodate the major components and to allow for the output wires to leave the box for connection to the detonator and they all employed a "Coupatan" timer bearing the manufacturing date of the batch of 480 timers ordered and supplied in 1997. All employed two toggle switches with on/off plates although in six devices the switches were of different size to those used in the others. The major components and internal wiring were glued in place with hot melt glue. Light emitting diodes (LEDs") of apparently similar type were a common feature in all the N. Ireland units and electrical resistors of 390 ohms were also found in each, unlike the London unit where the resistor was of 220 ohms. The battery packs were of a type involving a snap connector but while most used four 1.5v batteries several employed a 9v battery. The London unit was devoid of a battery pack.

[33] As to assembly, in the N. Ireland units the major components were all fitted through four holes in the base of the lunch box and all similarly configured. In three cases the four holes were so coincident that the possible

use of a template to make the holes in each was posited. So far as could be ascertained the sequence of components and wiring was similar. Similarly coloured wiring was used although Mr McAuley fairly pointed out that the likely explanation for that was the conventional use of appropriately coloured wiring for the various wiring tasks.

[34] Soldered connections were made to timer terminals, toggle switch terminals, the resistors and the LEDs. Mr McAuley attempted to draw conclusions about the common authorship of the soldering in the various units from the way in which the soldered connections were made. With regard to his search for physical matches between components, which might have tended to indicate assembly of units at the same time and place, he found no matches between any insulating tape ends, or cut plastic trunking or terminal blocks.

[35] Mr McAuley concluded that variances between components and some wiring types suggested that some of the units were made at different times when possibly different materials were available. None of the units could be described as identical although two, Newry Courthouse and Corry Square RUC station, were closely similar and another, Blackwatertown Road, had a plastic box with holes whose location was virtually coincident with the holes in the previous two. This led him to conclude that it was "*likely* (emphasis supplied both here and elsewhere in this judgment) that the same person was involved in the construction of these units". Interestingly, those are the consecutive incidents 8, 9 and 10 in the N Ireland series and all three occurred within the space of twelve days during July 1998. I shall refer to them as "Group 1".

[36] Mr McAuley's conclusions in relation to coincidence of authorship of other TPU's is less positive. In relation to Belleek RUC station, Newry Road Armagh, and Finaghy Halt which are incidents 5, 6 and 7 in the Northern Ireland series and which all occurred during fifteen days in May 1998 and also in relation to Omagh which is incident 12 and occurred in August 1998, "Group 2" as I shall call them, he is able only to say that similarities in the connections to those found in the Group 1 TPUs suggest that the same person "*may* have been involved in the construction of all seven in Groups 1 and 2. Furthermore, the TPU from Omagh was fragmented by the explosion so that only the remains of components were recovered. While some of the connections survived quite well as they were embedded in the glue and although most of the unit could be reconstructed from the components retrieved it was not possible to fully assess the overall construction of the device.

[37] In relation to the remaining four units of the eleven Mark 19s in the N. Ireland series, Mr McAuley could say only that "it is *possible* that the same person was involved in the construction of all the NI units." Regarding the

London unit he considered that the dissimilarities in its construction from that of the NI units lead him to conclude that the person who made the London unit did not make the Northern Ireland units although there was shared knowledge and access to similar components such as the timer. He reached a similar conclusion in relation to the TPUs found in the Republic of Ireland.

[38] The Defence were highly critical, not of the accuracy of Mr McAuley's examinations and physical findings, but of the validity of the conclusions that he had sought to draw from them. He made many very proper concessions in the course of his cross-examination. For example, he admitted that he was not an electrical engineer and had little prior knowledge of soldering. He agreed that, in assessing what were, or which he believed to be, similarities between the TPUs, he could not say what degree of shared knowledge might have existed, whether the lunch boxes might have been supplied pre-drilled, whether there was an assembly line with more than one participant and whether drawings might have provided to the assemblers. He agreed that he could not say how many people might solder in the same way and he agreed that there was nothing unique about it.

Conclusions on Common Authorship

[39] I can deal with this element of the case in short compass. I am not satisfied either beyond a reasonable doubt or indeed to any acceptable standard that Mr McAuley's painstaking work establishes common authorship of any of the Mark 19 TPUs. It is of course *possible* that some or all of them may have been made by the same person but the evidence at its height establishes no more than that. He cannot be blamed for the fact that there is no evidence whatever as to what became of the Coupatan timers after they were delivered in 1997 beyond the fact that a number of them turned up in Mark 19 TPUs in N Ireland, England and the Republic of Ireland. It has not been proved who received or distributed them, where or when any were used in making TPUs or by whom? There is no information as to whether all or some were manufactured by following a set of instructions or more than one set of instructions which could account for commonality of construction and design just as much as would common authorship. His conclusions as to the similarity of solder joints, based as he readily conceded upon an absence of any prior science, expertise in soldering or soldered joints, are, when examined, in reality no more than speculation. In the particular case of the Omagh TPU, which as I have earlier noted is out of chronological sequence with the other three in Group 2, the unavoidable absence of a complete TPU meant that Mr McAuley was unable to make a proper comparison with the other units recovered intact. It is therefore impossible to exclude the possibility that features of difference just as much as of similarity may have been destroyed by the explosion.

Prosecution strand 2 – The finding of Fibres on TPUs and at the Mobile Home

[40] As in the case of the TPU examinations, very considerable and detailed work was undertaken by two members of staff at FSNI, firstly by Dr Logan and later by Dr Griffin. In this case there was no significant challenge either to the findings or the conclusions arrived at by those scientists. The dispute rather centred on whether the conclusions did or did not support the prosecution contention that the N. Ireland TPUs were made by one person, the accused. Considerable numbers of fibres were removed from the TPUs as the common use of glue to hold the components together with insulating tape had provided highly retentive surfaces. That also meant that fibres were recovered from multiple parts of the devices which indicated areas of contact with a source of the fibres, supporting the proposition that the fibres were transferred during construction of the devices by contact with, it was assumed, knitted gloves composed of fibres in the particular recovered population.

[41] The acrylic fibres on each device were examined for significant populations, for fibres common between different parts of the device and for fibres common between different devices. On the TPUs for Crossmaglen, Forkhill, Newry and Banbridge no significant populations were found. On the remaining devices populations were identified which generally varied in nature from one device to another but three particular fibre types denoted A, B and C were found with possible commonality with more than one device. However it could not be demonstrated that each device in which a fibre population was found had the same fibres and therefore that the same gloves, or gloves of the same manufactured batch, had been used in the making of each TPU. Rather some contained fibres that were not found in others, suggestive if anything that different gloves (if gloves were indeed the source of the fibres) had been used in the making of some of the TPUs. For example, the single fibre type found on the Omagh device was not found replicated in fibres taken from other devices. Of course, if different woollen gloves were worn to construct the devices that neither proves nor disproves the existence of one or more makers as gloves are easily changed by or between one or more wearers and more likely perhaps to be so if the devices are made at more than one time. Nor was it asserted that any of the fibres found was of an uncommon type, rather they were consistent with having come from a mass-produced garment such as a woollen glove or perhaps a hat, a scarf or a pullover.

[42] In 2003 five fibres were recovered from various items in the mobile home adjacent to the accused's house which according to the tests performed on them (which did not include thin layer chromatography by reason of their inadequate length) matched four grey/black acrylic fibres found on the Lisburn TPU. Three of the fibres were on tapelifts from a sofa, one was from the collar of a cardigan and one from a pocket on another cardigan both

found with other clothes lying on the floor in the mobile home. None of the five fibres was attributable to the accused other than by its being found within the mobile home. There was no evidence as to who, if anyone, had lived in or had access to the home over the previous five years nor was any source garment for the fibres identified.

[43] Dr Griffin concluded that the fibres from the mobile home *could* have originated from the same source of fibres as those on the Lisburn device. In her opinion the four fibres recovered on the TPU could have been transferred by a limited contact with the source of the fibres and the five fibres found in the three locations within the mobile home could have been transferred by limited contact with the source of the fibres or an indirect contact through an intermediate item. She considered that the findings *weakly support* the proposition that the Lisburn TPU and the items from the mobile home have been in contact with the same fabric or garment. Interestingly, no fibres were found to match Fibre Types A, B and C, the main populations of fibres, nor any of the other individual fibres from any of the devices. Importantly, Dr Griffin's opinion was therefore that these findings support the proposition that the Lisburn TPU device was not made up nor had it been in the mobile home environment.

Conclusions on the fibre evidence

[44] I am not satisfied either beyond a reasonable doubt or to any acceptable standard that the unchallenged findings of Dr Logan and Dr Griffin help to establish common authorship of the twelve Mark 19 TPUs in the N. Ireland series. The most that they can be said to do is to provide support, in varying degrees, for the proposition that certain of the devices not including Omagh or Lisburn have been in contact with fibres from what are thought (but not shown) to have been acrylic gloves supposed to have been used by whoever assembled the devices. The findings at the Molly's Road mobile home made five years after the construction of the 1998 devices do not *by themselves* connect, even weakly, the accused to the Lisburn TPU in preference to any of the other unidentified occupants of or visitors to that home during the lengthy intervening period.

Prosecution strand 3 - the DNA evidence

[45] This strand requires the examination of a number of distinct but at the same time closely-interrelated aspects. The DNA results upon which the prosecution rely relate to exhibits collected from the scenes of the various incidents, taken into the possession of the police, transmitted to the Forensic laboratory for various examinations not initially including DNA, returned in many cases to the Police and ultimately transmitted to the Birmingham laboratories of the English FSS for testing for DNA by the Low Copy Number ("LCN") method. The prosecution case is that the examination of exhibits

from Lisburn, Armagh and Blackwatertown Road in the 1998 series of events and from the single 1999 incident at Altmore, four incidents in all, disclosed the existence of the accused's DNA on parts of the devices, thereby connecting him with the making and/or assembly of those devices.

[46] The Defence naturally focussed a great deal of attention upon each of these areas and carried out a commendably far-reaching and thorough examination of the police and forensic laboratory records relating to exhibits and, in the process, uncovered very many unsatisfactory matters. I do not propose to list all of those here but rather to give examples to exemplify the types of problems uncovered. It is highly important in this connection to bear in mind that, given the tiny amount of material needed to give a result using the LCN DNA technique, everyone agreed that especially stringent measures must be taken to avoid the contamination of samples. Dr Griffin indicated that the protective measures in the laboratory have been enhanced since the advent of LCN and the awareness of the need for the wearing of masks and hair covering to prevent the transfer of DNA from the examiner onto the item. The Defence submit, correctly in my judgment, that it is for the prosecution to establish the integrity and freedom from possible contamination of each item throughout the entirety of the period between seizure and any examination relied upon. They contend, and I accept the contention, that the court must be satisfied by the prosecution witnesses and supporting documents that all dealings with each relevant exhibit have been satisfactorily accounted for from the moment of its seizure until the moment when any evidential sample relied upon by the prosecution is taken from it and that by a method and in conditions that are shown to have been reliable. This means that each person who has dealt with the item in the intervening period must be ascertainable and be able to demonstrate by reference to some proper system of bagging, labelling, and recording that the item has been preserved at every stage free from the suspicion of interference or contamination. For this purpose they must be able to demonstrate how and when and under what conditions and with what object and by what means and in whose presence he or she examined the item. Only if all these requirements have been satisfactorily vouched can a tribunal have confidence in the reliability of any forensic findings said to have been derived from any examination of the item. In the following paragraphs I shall examine the extent to which the prosecution has succeeded in that task in this case.

Examples of problems in recovery, packing, storage and transmission of items by the Army, Police and SOCO

[47] *Lisburn*

Following the making safe of the Lisburn device the Army Technical Officer ("ATO") moved the remnants of the TPU from the driver's footwell onto the driver's seat where they were photographed. He then took possession of the

remains of the TPU and later handed them over. He could not explain how or for what purpose someone might have applied adhesive tape to the device although its absence from photographs taken at the scene showed that this had clearly been put on it by someone at some later stage. It might have been him but he could not think why. He thought some of the tape might have been put on by the Scenes of Crime Officer ("SOCO") but the latter denied that. The SOCO claimed that he had bagged the item at the scene and put it into his car and taken it to Lisburn Police Station where he handed it to a colleague. However an examination of the Lisburn station records does not confirm its receipt at the station at that time. The ATO had taken parts of the device to his base and the second SOCO later went there to collect them. He had bagged them because "items were never bagged by the ATO when you went for them". He said the Army wouldn't package them as "that was our job". They were lying next to each other. He had submitted the items for fingerprinting but had not considered submitting them for DNA examination as so far as he was aware none of the items was suitable for DNA. He said "In 1998 we didn't come across DNA" but he agreed with Mr Pownell QC that there would be a DNA problem arising from how the items were handled by the ATO. He said that in the last two to three years they now had to be very mindful of DNA contamination and now wear a full suit with headgear, mask, two pairs of gloves and a pair of overshoes. The only contamination they were aware of in 1998 was of fibres. The mystery of the added tape and the circumstances in which it came to be there were never explained in the course of the trial.

[48] *Armagh*

The ATO who disabled this device gave evidence that he was "fairly sure" of having removed the detonator from the detonator cord. He had twisted the detonator wires together to reduce the electrical risk as he would not hand them over untwisted. He said he "certainly would have noticed" the absence of wires in the outer sheaths. A member of the Army Weapons Intelligence Section ("WIS") gave evidence that he entered the scene with the SOCO after it had been made safe. He wore no special clothing and no gloves but he did not touch exhibits although he leant over them to photograph them. Until he left in 2000 there were no changes in his clothing. The SOCO gave evidence of bagging and labelling the detonator "JRJ 8" but he could not explain who had written on the bag or made alterations to the label. When asked to open the bag a piece of green plastic sheath without a wire core was found lying loose in it together with about five fragments of tape adhering to each other. He could not say that those loose items were part of the exhibit when he bagged it. Concerning DNA he said that it did not occur to him as he couldn't see any blood. "No-one knew how DNA was going".

[49] *Blackwatertown Road*

In this case there were no proper records relating to the custody of the items seized and bagged by the SOCO who was the same individual who had attended at Armagh. The items were not recorded in any station book such as the Special Property Register nor in the Major Incident Register. (It was a common feature of the evidence in this case related to the custody and preservation of property that recording was not carried out and it was often impossible to say by reference to any station record what item was where nor were records kept of who entered the property stores, when or for what purpose.)

[50] *Altmore Forest*

In this case a most disturbing situation was exposed by the Defence. It came to light that a Ms Cooper, then a SOCO but now apparently a police officer, gave evidence that she was wearing protective clothing at this scene when in fact she was wearing nothing of the kind, as photographs taken at the scene fortunately revealed. I add that she gave similarly incorrect evidence in relation to her apparel at Forkhill, again happily exposed by the availability of photographs. A Detective Chief Inspector Marshall also gave evidence about his wearing protective clothing at Altmore which photographs proved to be incorrect. These two witnesses were responsible for dealing with exhibits from Altmore including the TPU and for transporting it to the Forensic Laboratory in Belfast and later to the laboratory in Birmingham for DNA examination. The explanation as to how their untruths came to be told and the deliberate attempts, as I am satisfied they were, to conceal what the Defence not unfairly characterised as the "beefing up" of the initial statement of Ms Cooper are deeply disquieting. I am left in the position that I do not know what if anything I can believe of the evidence of these two and I am satisfied that, had photographs not been available to gainsay their lies, they would have persisted in seeking to and very possibly have succeeded in convincing me that, being at that time (somewhat unusually if the evidence of others is correct) alive to the possibility of DNA contamination, they were wearing suitable protective clothing to obviate such a risk. Such was my disquiet at their evidence and that of others connected with this matter that upon its completion I had transcripts of the evidence on this issue sent to the Police Ombudsman. The effect of this, as I find deliberate and calculated deception in which others concerned in the investigation and preparation of this case for trial beyond these two witnesses may also have played a part, is to make it impossible for me to accept any of the evidence of either witness since I have no means of knowing whether they may have told lies about other aspects of the case that were not capable of being exposed as such.

Examples of Problems with Police Storage arrangements and at Northern Ireland Forensic Science

[51] The evidence establishes that the arrangements within the police in 1998 and 1999 for the recording and storage of items were thoroughly disorganised. There were numerous examples of this during the trial with labels missing from items or incorrectly attached to the wrong item. Examples were given of labels lying loose and bags without labels. There was no universal system of logging items received, no proper recording in police stations so no inventory of what was in a store at any particular time. Station property registers were in some cases properly kept but more often not. For a major incident there should be a specific exhibit book but these were not always opened or properly maintained. Sometimes exhibits officers in serious investigations were not appointed initially or did not commence their duties promptly so that items remained unrecorded for periods and were then logged together with the same purported date of receipt regardless of when they had actually been received.

[52] As one example of the general picture given to the Court of the state of the police recording, handling and storage facilities, a SOCO who dealt with the Corry Square, Newry incident describing conditions at Newry police station at this period said he handed items over to an exhibits officer for the investigation but he could not say who that was as they did not at that time make records as to when and to whom items had been handed over. He said that at the time the Newry special property store was "a complete mess", that often an item he was looking for within it had not been recorded in the book and that bags within it could "spring a leak". He concluded on this topic by saying "fortunately I wasn't in the special property store very often, it was a mess."

[53] Another police witness described what he did with items that he was placing in the Newry store having brought them back from FSNI. He said that there were racks in the store and the first one with space you put them in to. He did not sort the exhibits into separate cases nor check them off against the FSNI sheets. He never signed any exhibit labels and there was no system for checking that the items in the store were those on the FSNI sheets. He never entered any items returning from Forensic Science in the Special Property Register and was never asked to do so. If an item went missing from the store there was no way of knowing who had removed it or what had happened to it. The Station Sergeant kept the key but there was no book to record the issue of the key; anyone could go to the Sergeant and get the key, he could put an item in or take an item out and it would not be recorded anywhere.

[54] Arrangements for the collection by police of items being returned to them by FSNI seem to have been equally informal. The last witness described the procedure he followed on being sent there to collect items. He said FSNI

would have them ready on his arrival. The items would be brought out in something like a supermarket trolley, maybe up to four or five trolley loads. He would then go back to reception and sign. He trusted them that they had given him the forms to which the items related to sign. There was therefore no system for verifying what had been collected or what was then placed in the police store.

[55] Detective Chief Superintendent Baxter agreed with Mr Pownall that there had been difficulty in finding some exhibits and others including TPUs had never been found. There was disagreement between FSNI and the police as to who was responsible for that. With regard to the adequacy of the police storage arrangements for exhibits he said that an inspection by Her Majesty's Inspectorate of Constabulary published in 2001 or 2002 found that there was a need for improvement of the storage of exhibits and that generically the RUC had a difficulty in the management of exhibits. He agreed that the problem related not merely to the storage but also the condition of exhibits with, for example, exhibit bags open when they should have been sealed and that he was aware of vehicles in the case having been disposed of and in another instance of a car being left outside with the result that it rusted so as to make further useful examination of it impossible.

[56] Problems related to the handling storage and tracking of exhibits were not confined to the police, within FSNI there were also problems. When the police recognised that it might be possible to again carry forward this investigation their first endeavour was to try to discover the whereabouts of and gather in the exhibits from Omagh and what were believed to be the various linked scenes. As the foregoing descriptions will have illustrated that was no easy task for the police given the inadequacy or absence of the necessary systems. Within FSNI Dr Griffin was appointed as the lead scientist for this purpose in February 2001. Her initial task was to try to locate the items that were supposed to be in the various sections of the laboratory. Apparently there was a barcoding system in place but not every section had a bar code reader. Labels had become detached from items because they were held on with sellotape which had aged and dried up. She agreed that this had led to a problem in another prosecution where DNA findings had been wrongly attributed to an accused and that this and an "accumulation of minor errors, minor ineffectiveness of the quality system" had led to the temporary suspension of the laboratory's accreditation by the United Kingdom Accreditation Service. Dr Griffin was asked about a memo written by her to a colleague during the search: "Please search this week, the SFU garage, photography, Bio boxes for any unidentified bits that might be related to the Omagh or related incidents i.e. anything lying around without a label..." She explained the purpose of this by saying: "all we were trying to do was spring clean those areas and make sure there was nothing identifiable from any of the incidents we were looking at." When I asked what would happen if items were recovered either from within or without the laboratory whose prior

whereabouts or the nature of any handling in the interim were unknown her response was that if the item were recovered it would be assessed as to its condition and the handling that it had had before a decision was made as to whether further work could be done on it. How this assessment was to be usefully made without reliable information as to where the item had been, with whom and in what conditions was not explained by the witness.

[57] Dr Griffin was questioned about the laboratory practice in relation to allowing persons not involved in the examination of items to look at them. Her initial response was that if they did so they would in general be looked at through the packaging. She was then asked about an e-mail to her from Dr Adams, the then Director of FSNI, of 12 September 2001 in the following terms:

“Subject: Omagh

“I was looking at the minutes of the last Forensic Management Team meeting.

I don't know where profiles/partial are coming up in the Omagh case but I know that I was shown the bit of TPU box out in Explosives. *I don't remember touching anything but who knows. Lots of other people were shown these things although I guess most would not have had actual contact. Were there any profiles found on pieces recovered from the debris? – If so I presume the profiles of the recovery team have all been eliminated.*

Late in the day and probably of no value but I felt I have (sic) better pass these thoughts to you.”

This is a disturbing document, contemplating as it does at least the real possibility that an item that was subject to LCN DNA examination had previously been handled by Dr Adams and, even more seriously, by other persons whose identity was not known. The candid response of Dr Griffin was that she assumed that in 1998 the examinations (of items) were complete at that time and added: “ the handling, prior to the review, the reassessment (in 2001) was not to the same LCN standards” and later “at that time they would have assumed that the examination of that item was complete.” Dr Griffin later checked the laboratory records at the request of Mr Vaughan but could find no record of Dr Adam's having looked at the item

[58] It was volunteered by Dr Griffin that while people in the laboratory would have worn lab coats when exhibits were being examined in 1998/1999 she could not say whether they would have worn gloves and they certainly would not at that time have worn masks or hats. She accepted that the FSNI procedures for LCN DNA only began to develop around 2000 when knowledge of the Low Copy technique was obtained and accepted that the

following was a correct quotation from the protocol within the laboratory for LCN effective from 9 July 2002:

“Current DNA profiling methods are very sensitive. Using SGM+, the routine system employed at FSNI, it is possible to detect very low levels of DNA. Special treatment called LCN DNA profiling pushes this system to its limit. This technique may have value in certain limited situations where all evidential avenues have been exhausted.

The increased sensitivity is accompanied by an increased risk that the DNA to be analysed does not come from the victim or offender but from some other person not involved in the offence. It may have originated legitimately before the offence or from contamination after the offence.”

She agreed that when the exhibits in this case were initially examined in the laboratory in 1998/99 there were no programmes in place within the laboratory to cater for the special examination and cleaning regimes necessary for the examination of items that might yield LCN DNA profiles.

Conclusions on the Integrity of Items subjected to LCNDNA Examination

[59] At paragraph [46] above I set out the detail and my acceptance of the Defence submission as to what must be established on this question before reliance for evidential purposes could be placed on the results of any subsequent DNA, and most especially LCN DNA, examination of the item. My subsequent description of some of the evidence concerning the actual regime that prevailed both within the police and NIFS during the relevant period demonstrates how far short of surmounting that high hurdle the prosecution has fallen in this case. It is not my function to criticise the seemingly thoughtless and slapdash approach of police and SOCO officers to the collection, storage and transmission of what must obviously have been potential exhibits in a possible future criminal trial but it is difficult to avoid some expression of surprise that in an era in which the potential for fibre, if not DNA, contamination was well known to the police such items were so widely and routinely handled with cavalier disregard for their integrity. The position so far as NIFS is concerned is even more difficult to comprehend as everyone there must have been very well aware of the risks of improper labelling, storage and examination. In partial mitigation of the established FSNI shortcomings it may I suppose be recalled that before the re-examination of the case was initiated in 2000 or 2001 everyone at FSNI probably did think that the examinations of the items in this case were complete.

[60] What I do find extraordinary is that, knowing that these items had not been collected or preserved using methods designed to ensure the high degree of integrity needed not merely for DNA examination but for the more exacting requirements of LCN DNA, examinations were performed at Birmingham with a view to using them for evidential rather than solely intelligence gathering purposes. The findings of those examinations were put forward and stoutly defended by Mr Whitaker of the Birmingham FSS laboratory as evidence that the Court might safely rely upon as tending to establish the guilt of the accused. This despite the fact that one police and SOCO witness after another and also Dr Griffin had candidly made clear that possible examination for DNA was not in their minds at all as they were collecting, storing, transmitting and dealing with these items in 1998. Why therefore would they then have had present to their minds and been complying with the exacting integrity requirements which reliable DNA examination and most especially that in its LCN form demands? All this NIFS must have known very well when it co-operated in searching for and collecting items for LCN examination in Birmingham and again later when the idea of using the results of those examinations as evidence in this trial must have been under discussion. By that stage the problems inherent in the need to prove integrity had plainly come to be appreciated by one or more police officers concerned in this investigation as was shown by the mendacious attempts to retrospectively alter the Altmore Forest evidence so as to falsely make it appear that appropriate DNA protective precautions had been taken at that scene.

[61] However, all I need say further on the subject for the purposes of this trial is, that having carefully reviewed all the evidence on this issue, I am not in the least satisfied in relation to any one of the items upon which reliance is sought to be placed for the results of their LCN DNA examinations that the integrity of any of those items prior to its examination for that purpose has been established by the evidence. Accordingly I find that that DNA evidence, the third and final strand remaining in the prosecution case, cannot satisfy me either beyond a reasonable doubt or to any other acceptable standard.

The LCN DNA Debate

[62] In view of my conclusions on each of the three strands of the prosecution case it is not necessary for me to proceed to discuss in any detail the very extensive evidence given as to the present reliability or unreliability of the LCN procedure for the purpose of obtaining data of evidential quality (as opposed to intelligence gathering) and on the significance or otherwise of the particular findings said to have been made by the FSS Birmingham laboratory in this case. However I was concerned at the wide variance in expert opinions, not only as between the Prosecution and Defence but also between the two experts called for the Prosecution. The central plank in the attack made on the evidential value and reliability of this system by the

Defence witnesses, Dr Krane and Professor Jamison, was that the LCN system which had been invented by Dr Gill of Birmingham FSS and whose use for evidential purposes is being promoted by him and a colleague at that laboratory, Dr Whitaker, has not been “validated” by the international scientific community. The Defence experts claimed, inter alia:

1. That LCN has only been adopted for evidential purposes in two other countries in the world, the Netherlands and New Zealand.
2. In the United States a different and much more stringent operating system for LCN is in place despite which the system is only used for intelligence purposes except in a single known case where the American LCN system was used evidentially.
3. There has been no international agreement on validation and a conference held in the Azores in September 2005 had ended with agreement only that more work in that area was needed.
4. This lack of agreement on LCN was in marked contrast to the normal SGM+ test for DNA for which there were internationally-agreed validation guidelines and definitions approved by the Scientific Working Group on DNA Analysis Methods (SWGDM).
5. “Validation” is defined in those guidelines as “the process whereby the scientific community acquires the necessary information to:
 - Assess the ability of a procedure to obtain reliable results.
 - Determine the conditions under which such results can be obtained.
 - Define the limitations of the procedure.

The validation process identifies aspects of a procedure that are critical and must be carefully controlled and monitored. “

6. Most analytical procedures have a degree of uncertainty associated with them. When a scientist (or a lawyer) receives a result he wishes to know what degree of reliability can be placed on the result so that he can judge its degree of probative value.
7. However, in the case of LCN there is no validation other than the assertion by Drs Gill and Whitaker that two published journal papers they had written amounted in effect to peer review and thereby the necessary validation, a proposition which was strongly disputed by the Defence experts.

8. "Reproduceability" is the ability to produce the same result more than once, is a very important determinant of reliability. If, for example a test were performed twice with a matching result could it be reliably predicted that the same result would occur if the test were repeated a third or fourth time? If not what would that say about the reliability of the testing and the reliance that could be confidently placed in its results?
9. The standard practice at Birmingham was to perform the test on two aliquots of the same sample whereas in the United States they insisted upon three.
10. In the present case an experiment had been done at Birmingham in which three tests had in fact been run with the result that the consensus produced by the first two tests was removed by the differing results then thrown up by the third. Thus the normal approach used in the United Kingdom had unintentionally been demonstrated by its own proponents to be potentially (and in that particular instance actually) misleading.

[63] I was concerned about the manner and content of the response of Dr Whitaker to these criticisms. He was most unwilling to accept that the continuing absence of international agreement on validation of LCN (unlike SGM+) or the variations in the way in which it was being implemented in different countries should be any impediment to the ready acceptance by any court of the Birmingham approach. I found him inappropriately combative as an expert witness and his unwillingness to debate constructively the various matters put to him was unhelpful in the extreme. By contrast, his colleague Dr Gill, while understandably concerned to endorse the views of Dr Whitaker where he properly could, was willing to carefully consider the propositions put to him by Mr Pownall QC and, where appropriate, to disagree with his colleague on important issues both general and specific to the case. In my view it was extremely fortunate that the prosecution decided late in the day to call Dr Gill as his evidence greatly helped to inform and bring some objectivity to the debate.

[64] I have devoted a little space to this subject because of my concern about the present state of the validation of the science and methodology associated with LCN DNA and, in consequence, its reliability as an evidential tool. The House of Commons Science and Technology Committee published on 25 July 2005 the Government's response to the Committee's Report "Forensic Science on Trial" which had been published on 29 March 2005. At paragraph 55 the Committee's comments on validation are repeated together with the Government's response. Both merit reproduction here:

“55. The absence of an agreed protocol for the validation of scientific techniques prior to their being admitted in court is entirely unsatisfactory. Judges are not well placed to determine scientific validity without input from scientists. We recommend that one of the first tasks of the Forensic Science Advisory Council be to develop a “gate-keeping” test for expert evidence. This should be done in partnership with judges, scientists and other key players in the criminal justice system, and should build on the US Daubert test.”

The Government responded:

“...the Home Office, ACPO and APA are planning to consult with stakeholders on the issue of quality regulation in forensic science. The establishment of a regulator is one of the options to be considered, as is how the courts can be supported in appropriately weighing scientific evidence.”

When Dr Gill was asked about this in the course of his evidence he said that he did not know whether anything had yet been done by government to further the plan. If it has not then I consider that the evidence given in this case by the FSS witnesses reinforces in the clearest way possible the need for urgent attention to this task for I am not satisfied that the publishing of two journal articles describing a process invented by the authors can be regarded without more as having “validated” that process for the purpose of its being confidently used for evidential purposes.

Final Conclusion

[65] I am acutely aware that the stricken people of Omagh and every other right-thinking member of the Northern Ireland community would very much wish to see whoever was responsible for the outrageous events of August 1998 and the other serious crimes in this series of terrorist incidents convicted and punished for their crimes according to law. But I also bear firmly in mind the cardinal principle of the criminal law which, in delivering the judgment of the Court of Appeal in *R. v Steenson and others* [1986] NIJB17 at page 36, Lord Lowry LCJ re-emphasised in his concluding observations:

“Justice ‘according to law’ demands proper evidence. By that we mean not merely evidence which might be true and to a considerable extent

probably is true, but, as the learned trial judge put it, "evidence which is so convincing in truth and manifestly reliable that it reaches the standard of proof beyond reasonable doubt."

The evidence against the accused in this case did not reach that immutable standard. Accordingly I find Mr Hoey not guilty on each of the remaining counts on the indictment.