An Chartlann Náisiúnta
National Archives

Reference Code:	2020/17/52
Creator(s):	Department of the Taoiseach
Accession Conditions:	Open
Copyright:	National Archives, Ireland. May only be reproduced with the written permission of the Director of the National Archives.

THE MAGUIRE CASE

The Maguires and Conlon were convicted of possession of explosives on the sole evidence of the alleged presence of nitroglycerine (NG) on the hand swabs taken from six of them and on a pair of rubber gloves said to be owned by a seventh and found in a kitchen drawer. The nitroglycerine was said to have been detected by use of one test based on thin Layer Chromatography and using "Greiss" reagents and is referred to as "The Greiss Test". The original court case revolved around the dependability of the test to demonstrate nitroglycerine unequivocally. While this is an important issue it is far from being the only one. However, because of its importance it is necessary to consider the matter in detail.

The Test

Hands or other objects to be tested are swabbed with cotton wool. The swabs are extracted with a solvent with the idea of removing any explosives. The solvent is evaporated to a small volume and a portion of the solvent is placed using a very thin glass tube on a "plate" of glass or aluminium which has been coated with silica gel. A spot of the known explosive is placed close to the test spot which has been placed a short distance from the end of the plate. The plate is then stood in a tank with some liquid (eluent) in the bottom to such a level that the liquid is below the level of the spots on the plate. The eluent is then drawn up the plate by capillary action carrying with it the constituents of the sample which move to different

©NAI/TSCH/2020/17/52

distances. When the eluent reaches a certain height on the plate the plate is removed from the tank. The eluent is allowed evaporate and the plate is sprayed with a certain concentration of caustic soda. It is put into an oven at 100 degrees for ten minutes. When cool, the plate is sprayed with a chemical solution known as Greiss reagent. A colour spot is produced at the site or sites to which the constituents have been carried by the eluent. The distance travelled by the spot is compared to the distance travelled by the solvent and this is known as the Rf value.

Uniqueness of test

At the original trial the Crown claimed the test was unique and evidence was given to this effect by the prosecution witnesses. But just before the end of the trial and at the appeal it was pointed out that the substance PETN also gave the same pink colour at the same Rf value as nitroglycerine. But if the courts took the point up at all it was to dismiss it on the basis that PETN was also an explosive. However, the relevance of the point was that the Greiss test is not unique for nitroglycerine and consequently it was not valid to use this test as the only one. If one other substance like PETN and EDGN gave the same spots it is never possible to eliminate the possibility that other commercial or naturally occurring substances do likewise.

Need for verification

The Greiss test was intended to detect substances like NG in bulk explosives or in debris from an explosion, i.e. in closed systems already known to involve explosives. For example, in analysis of gelignite, one would start with colour, consistency, odour, microscopic appearance and then analyse for NG, EGDN, nitrotoluenes, ammonium nitrate, sawdust, nitrocellulose and the sum total of observations will indicate a gelignite. However, by using the Greiss test in total isolation it is taken out of all its previous contexts and is expected to provide a definite answer to a question it should not have been asked.

©NAI/TSCH/2020/17/52

While the test when operated correctly in trained hands will indicate NG in the context of this case, a second test of some type would have been vital to support the contention of the existence of NG. It is completely accepted in the forensic community that evidence of NG based solely on the Greiss test would not nowadays ever be tendered in court. At least one other confirming test would be done.

It is argued that times change and tests and procedures improve and criteria used today should not be applied to the first half of the 1970's. However, it cannot invalidate the fact that the means of detecting NG should stand the test of time and should be unequivocally accepted today.

Need for care in the test

An understanding of the scientific principles behind TLC is necessary to carry out the test as is an appreciation of the potential of contamination giving false results. For example, among the possible area of error is colourblindness as the colour of the spot is relevant, unreservedly assuming that toluene is the eluent in the tank, using the wrong type of coating material on the plate, mixing up the very thin glass tubes used to spot the plate, mixing up the glass vessel into which the swabs were extracted, getting items contaminated by the control explosives, etc.

It could be argued that inadequate care was taken in the general approach to the performance of the tests in that:

(a) Confirmatory tests were not done when at the time it was the norm in the normal forensic science laboratories.

(b) It does not appear that a second person verified the results obtained.

(c) The plates were not retained for subsequent examination. If plates that fade quickly were used they should still have been retained or the question could be asked the reason for not using good quality plates which would retain the test results for a long time particularly in view of the importance of the test to seven people.

©NAI/TSCH/2020/17/52

(d) The tests were done at the Royal Armament Research and Development Establishment (RARDE) at Woolwich rather than at a forensic science laboratory which would be well acquainted with the need for great care in evidential matters. Crime cases would be very rare at RARDE and consequently forensic expertise would not be available there.

(e) While the precise involvement of the trainee in the tests is not clear it is strange that one of such limited expertise should have any role in an important case.

(f) The normal practise in forensic laboratories of retaining swabs even after extraction and of washing the container into which the swabs were extracted into sealed containers was not done.

Persistence of NG

The length of time that NG remains on hands after contamination is not of much relevance in this case as the Crown could not specify a time of handling the explosive. However, it is important to get some time span in which the hand could have been contaminated. Published research indicates that heavily contaminative hands can show positive for nitroglycerine for periods up to 20 hours after contamination under test conditions. The substance ethyglene glycol dinitrate, EGDN, which always occurs with NG in gelignite can only be detected for 3-4 hours after contamination. It was found that if the contaminated hands were washed thoroughly then the explosive was removed and removal also occurred when contaminated hands were lightly washed frequently over a period of time. It was also reported that sleeping in bed caused the "disappearance" of traces. In order to get sufficient quantities of NG on the hands to allow detection for many hours it is necessary for the hands to come into contact with the explosive itself.

NG can be lost from hands in a variety of ways - by washing, by evaporation from the skin, by smearing onto objects touched, by absorption through the skin and subsequent metabolism in the body.

©NAI/TSCH/2020/17/52

Consequently, it can be concluded that if NG was present on the hands it was picked up during the day of the swabbing.

However, there are some unusual aspects pertaining to persistence. Firstly, why so many persons, viz seven, should actually handle the unwrapped explosive. The time consuming part of bomb making is related to detonation and timing mechanism and gelignite is quickly and easily manipulated into a desired shape in the device. Irrespective of the number of bombs being made there would not seem to be any need for the involvement of that number.

Secondly, they would be conscious of the odour and stickiness of the gelignite and would be likely to thoroughly wash their hands at the earliest opportunity.

Thirdly, it is not possible to recall any incident before or since when so many swabbed positive in connection with any one event. In other words it was an unique occurrence and this does not contribute to acceptance.

Finally, the absence of nitroglycerine on the personal clothing and objects in the house is remarkable. If seven people handled explosives sufficiently to get their hands or gloves heavily contaminated then table surfaces on which the bombs were prepared must have been very contaminated as would chairs, doors, etc touched by the contaminated hands. The cuffs of their garments should have been contaminated by the explosive as well as pockets into which hands were put. In this regard clothing is much more effective at retaining traces of explosives than hands as it will neither be frequently washed nor will an explosive like NG be metabolised on clothing as it would be on skin. It cannot be argued that the house was cleaned since it would have been illogical to leave the most obvious items, the hands, still contaminated.

Absences of other explosives

The only possible source of NG are explosives of the gelignite type which consist, depending on use of the gelignite, of more than 60% of little pieces of solid ammonium nitrate, of more than 25% of the thick oily-type NG and low percentages of oil-like nitrotoluenes, ethylene glycol dinitrate which would be in a concentration close to that of NG and finally nitrocellulose. It would not be

©NAI/TSCH/2020/17/52

possible to handle gelignite without getting traces of all the explosives on the hands. It is most unusual to find NG and not ammonium nitrate which is present in greater quantities. It appears that swabs wetted with water were taken from the hands of each person and this would be specifically for the detection of ammonium nitrate and yet there is not evidence that this explosive was sought and/or found. The finding of NG alone points to the only innocent way of getting nitroglycerine namely from heart tablets but with seven people contaminated and without such tablets being found in the house this possibility is unlikely. It is suggestive of some serious error in the whole swabbing and testing procedure.

Miscellaneous points

Beside the total absence of any bulk explosive or trace of explosives on anything in the house, bits and pieces of the component parts of bombs were not found. The components of bombs would involve detonators, wires, insulating tape, solder, batteries as well as the bomb container. The scale of operation necessitating the handling of the actual explosive by seven people would also involve a large amount of bomb making equipment including work tools and it is difficult to believe that every trace could be removed. If it is argued that the bomb making was carried out in some other building it is strange that such premises never came to light in police investigation,

Obviously, the gloves in the kitchen drawer could have been contaminated if any one of the other six did have NG on their hands and put their hands into the drawer.

Specific comments on points raised in the Home Office Memo

(a) Paragraphs 1-4 (B) - describe a swabbing process, the conveying of exhibits to a laboratory and the Greiss Test. But it does not state what precisely happened in the Maguire case. If an innocent contamination or error occurred even the scientist (technician) involved would be unaware of it.

©NAI/TSCH/2020/17/52

(b) Paragraphs 1-5 (C) - deals with the validity of the TLC test. It is accepted that the Greiss test will give you a particular reaction for NG but it is now known that the same reaction is obtained for PETN and EGDN. In other words it is not a unique test for NG. The fact that PETN and EGDN are explosives is not relevant in this case as the test was presented as being unique for NG.

(c) Paragraphs 4-7 (I) - deals with innocent contamination which is rejected on the grounds of lack of evidence. However, contamination is always a possibility in forensic science and must be seriously considered when contrasted with the Crown's contention that the extremely unusual occurrence of seven persons swabbing positive for NG in a single incident.

(d) Paragraphs 8 and 9 - deals with fabrication of results but obviously there is nothing to support this. Under certain circumstances one could suggest that a strong belief in guilt coupled with an enthusiasm for a conviction might pave the way to action leading to such fabrication.

(e) Paragr aphs 10 - 12 (E) - deals with the carrying out of the tests by an inexperienced assistant. It is not possible to precisely grasp the extent of his involvement in the test although why an unexperienced person had anything to do with such a serious case is not explained. It is said that his work was closely supervised but the closeness is not detailed.

(f) Paragraphs 13 - 14 (C) - deals with the odd results of swabs taken from Patrick Maguire Snr. and while it is a point there is no doubt that deficiencies in swabbing technique can occur.

(g) Paragraphs 15 - 16 (C) - deals with Mrs. Maguires gloves and little emerges from the content. The relevant points are that any of the other six could have transferred NG to these gloves by putting their allegedly contaminated hands in the drawer and touching the gloves or else any of the other eight persons in the house could have used them when handling bombs as the gloves appear to have been accessible to every one.

©NAI/TSCH/2020/17/52

(h) Paragraphs 17 - 19 (C) - deals with contamination of gloves after been seized by the police. The same comments as were made regarding the hand swabs are relevant here. However, the point that "a sniffer device" did not detect traces of NG in the drawer is important because as the gloves lay in the drawer NG would slowly evaporate off and condense on the inside of the drawer. However, the sensitivity of the sniffer is not given and it might have been very insensitive to NG. Possibly of more general importance is the fact that despite the widespread contamination on hands NG was not found anywhere else by TLC or sniffer.

(i) Paragraphs 20 - 23 (I) - deals with TLC tests done for NG on the hands of 900 persons with no positive response. It is difficult to see the relevance of these random tests as it was never suggested that the Greiss Test would show positive for large sections of the population. What is at issue is that it is not a unique test for NG and it is a test which must be done very carefully and interpreted very carefully by trained scientists.

The second point dealt with is that of contamination by NG-containing heart tablets and this is not really of much significance.

(j) Paragraphs 24 and 25 (I) - deals with the fact that the swabs, extracts and plates have been destroyed before the appeal. The excuses that the swabs had been extracted and the plates would have faded is difficult to accept. The forementioned items should have been kept as is normal practice in forensic laboratories. Beside that it should be stated that swabs are never 100% extracted so some explosive will remain to be detected by very sensitive techniques; the extract of the swabs will not be totally used up in the test and the residue should have been retained; while some plates fade it is generally possible to make out faint spots.

©NAI/TSCH/2020/17/52

(k) Paragraph 26 and 27 (C) - Points out that it was not the practice to take photographs of the plates. While this is understandable it emphasises the fact that the test was never verified.

(l) Paragraph 28, etc - deals more with legal points.

©NAI/TSCH/2020/17/52