The Protocol

Code of Practice for Investigators of Fires and Explosions for the Criminal Justice Systems in the UK

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1. **AIMS**

1.1 The Protocol has been developed to ensure that individuals engaged in the examination of fire and explosion scenes within the framework of the Criminal Justice Systems of the UK (England, Wales, Scotland and Northern Ireland) work within the unified code of practice set out herein. It is acknowledged that such individuals may work within private sector organisations (such as fire investigation, insurance consultancies or commercial forensic science providers), public sector organisations (such as fire and rescue services or police services) as well as academic institutions.

1.2 The Protocol sets out:

1. a code of practice for fire investigators detailing the appropriate understanding, knowledge and competencies required to undertake fire and explosion scene investigations within their particular area of expertise.

2. a structured, systematic approach for the engagement of fire investigators within the investigative process such that their participation maximises the quality of the information obtained from the scene investigation assisting in the production of robust evidence for the criminal justice process.

3. the requirements for scene investigation, specifically for the identification, recording, recovery, interpretation and presentation of specific types of evidence encountered, in accordance with applicable quality standards and accepted national and international procedures. (For example, but not limited to, those presented in Skills for Justice National Occupational Standards relating to fire investigation (SJFFI1, SFJFI2, SJFFI3), the chartered Society of Forensic Sciences diploma in fire investigation, the Institution of Fire Engineers Unit 6 fire investigation (T/505/5936) and the International Association of Arson Investigators certified Fire Investigator Program).

1.3 The Protocol maps to the requirements of ISO 17020 within the context of fire and explosion scene investigation and to the Forensic Science Regulator’s Code of Practice

2. **SCOPE**

2.1 The Protocol is directed specifically at fire investigation practitioners who undertake casework within the UK criminal justice systems.

2.2 The Protocol outlines a code of practice and the standards expected in relation to the investigation of fire scenes and scenes related to physical or gas phase explosions within the UK criminal justice systems.

2.3 The Protocol does not include the chemical analysis of fire debris for the presence of ignitable liquids.

2.4 The Protocol does not include examination of scenes relating to explosive devices or events associated with terrorist activity.
3. DEFINITIONS

3.1 Fire scene investigators: In the UK, fire scene investigators include practitioners from both the public (fire and rescue service nominated fire investigation officers and officers tasked with determining whether a particular scene may involve deliberate ignition, police, publicly funded forensic science providers, academic and other public bodies) and the private sector (fire investigation organisations, private forensic science providers and other commercial organisations).

3.2 Deployment to incidents: The nature of deployment of fire investigators will depend upon the nature of the incident and the level of response required. This is a judgement made on a case by case basis. Incidents may require a low resource response, a technical specialist or a multiagency response to be deployed. In all cases, fire investigators must work within their areas of expertise and competence.

3.3 Fire scene investigation: in its broadest sense involves the assessment of evidence related to a fire scene or a physical/gas phase explosion together with post fire/explosion damage to provide a determination (where possible) of the area(s) of origin of the fire/explosion, the most likely ignition mechanism involved and the mechanism by which a fire/explosion may have developed and spread.

3.4 Specialist information: Fire scene investigators may also provide information of a specialist nature such as the interpretation of electrical causes of fire or the computer modelling of fire behaviour. Fire scene investigators may also recover items from fire scenes for the purposes of further laboratory based investigations.

4. REQUIREMENTS (ISO/IEC 17020:2012:4)

4.1 GENERAL

4.1.1 Fire investigators must be impartial and independent and undertake their investigative duties with professionalism, maintaining the confidentiality of all materials relating to their investigation. Fire investigators must provide impartial, expert opinion to the court.

4.1.2 Fire scene investigation is an opinion based process supported by a broad body of scientific and engineering knowledge and the specific skills and experience of the practitioner.

4.1.3 Fire scene investigation demands a level of scientific and discipline specific knowledge, skills and competence for an investigator to be in a position to determine the origin, cause and development of a specific event.

4.1.4 A fire investigator must be competent to proffer a professional opinion on the origin, cause and development of a fire within their area of expertise and must not overstep the boundaries of their expertise.
4.1.5 Fire investigations must be undertaken following a systematic data gathering and investigative approach (widely known as the ‘scientific method’) accepted within the fire investigation community and presented in appropriate national and international guidance and reference documentation.

4.1.6 At all times, good scientific practice must be followed and particularly where items are being recovered from fire scenes for further analysis or examined in situ. This includes recording the items correctly in situ and recording the recovery, packaging and labelling of items.

4.1.7 If the fire investigator is required by law or otherwise requested to release information they must inform the instructing authority of these requirements.

4.1.8 The recognition of the fire investigator as an expert witness is a matter decided upon by the courts, and fire investigators must have an awareness that they may be called to present evidence in this capacity and are responsible for ensuring they have full awareness of the responsibilities of an expert witness.

4.2 VALIDATION

The techniques, and equipment used throughout the fire scene investigation should be scientifically validated either through the professional literature or by an in house validation method.

Samples recovered from a fire scene requiring chemical analysis must be transferred to a laboratory where analytical testing conforms to the appropriate quality procedures (normally ISO/IEC 17025) or if not, the reasons for using a different facility should be fully documented.

4.2.1 Scene Examination

4.2.1.1 Area of origin

Validation of the interpretation of the origin of a fire or explosion involves an assessment of factors which must include (but is not limited to) the observed post fire indicators such as burn and smoke patterns, the fire load, the observed degree of damage and ventilation and temperature indicators. The basis for the interpretation of these factors is well documented in the professional literature. Relevant support for the findings of the area of fire origin(s) should be documented.

4.2.1.2 Cause

Validation of the interpretation of the cause of the fire must involve an assessment of all viable ignition sources on a case by case basis. These can include, but are not limited, to chemical or biological cause (including self heating), electrical, naked flame, radiant heat, mechanical or smoking
materials. Support for the inclusion or exclusion of a potential ignition source
present at the scene must be documented.

4.2.2 Estimation of uncertainty

Tests and measurements used in fire scenes are indicative and not
quantitative. Uncertainties in the entire forensic fire scene investigation
process arise from a number of sources which include:

1. competence of the investigator and their specific expertise,
2. information received,
3. specific environmental conditions,
4. destruction of evidence due to the fire,
5. fire suppression activities.

These factors must be taken into account on a case by case basis in the
interpretation and evaluation of a scene.

4.3 ROLES AND RESPONSIBILITIES ((ISO/IEC 17020:2012:6, NOS SFJFI1, SFJFI2, SFJFI3))

4.3.1 In general, the degree to which a fire investigator will be engaged in any
investigation will be defined by their specific expertise and documented in
their terms of reference.

4.3.2 Fire investigators responsibilities include:

1. understanding their role within the investigation and the investigative
team,
2. understanding the potential for other evidence types which may be
present at the fire scene,
3. understanding relevant crime scene and laboratory procedures
required to ensure the preservation, integrity, continuity and
confidentiality of evidence as well as their disclosure obligations,
4. ensuring as far as practicable that the methods used in the
investigation of the fire scene are accepted by the fire investigation
community and/or are peer reviewed (for example in the relevant
scientific literature),
5. reporting and justifying in case notes or within their statement/report
as appropriate, any deviations from accepted fire scene investigation
practice,
6. ensuring that their examination does not impact adversely on the
requirements of other specialists at the scene but rather works
alongside other specialists to maximise the overall opportunities of
quality of evidence recovery at the scene,
7. exercising all reasonable professional skill and care to prevent
avoidable danger to health or safety and to prevent avoidable adverse
impact on the environment,
8. making and retaining full, contemporaneous, clear and accurate records of the examinations undertaken. These may include (but are not limited to) the terms of reference, a scene plan detailing where items were within the scene including, if appropriate wiring diagrams, decision making and scene examination strategy, the time tasks were undertaken, and exhibits/productions recovered. All records must be maintained in appropriate and secure storage and must be disclosed in their entirety, in a timely manner, if requested,

9. ensuring the security and storage of all correspondence in electronic or physical format including text and images,

10. understanding the reliability (precision and accuracy), variability (statistical variance), errors and calibration related to any instrumental measurement or engineering method undertaken including ‘ad hoc testing’,

11. writing statements and reports and attending court to give evidence if called upon to do so,

12. undertaking appropriate formal and informal peer review and critical checks of statements and reports,

13. presenting findings and evidence in a logical, balanced, transparent and robust manner confining opinions to those based on personal skills, professional experience and knowledge,

14. ensuring a full understanding of the ethical standards required and the expectations and obligations of appearing as an expert witness for the courts,

15. understanding the admissibility of expert evidence (whether tendered by the prosecution or the defence) in criminal proceedings and the disclosure obligations of witnesses,

16. presenting evidence in a fair, unbiased and impartial manner with honesty, integrity and objectivity, and without any form of discrimination,

17. taking all reasonable steps to maintain and develop their professional competence, through membership of a professional body and engaging in continuous professional development or other agreed competency framework,

18. alerting appropriate authorities to any findings which may have implications for public safety,

19. ensuring (if appropriate) that professional indemnity Insurance is in place.

4.4 PERSONNEL (ISO/IEC 17020:2012:6, NOS SFJFI1, SFJFI2, SFJFI3)

It is recognised that fire investigators have a wide range of experience and background knowledge. Their training and knowledge can be arrived at through a wide ranging combination of qualifications (academic and/or non-academic), structured specialist training courses and experience of scene investigations within the fire investigation domain. Irrespective of the means
used, fire investigators must have the essential knowledge and skills presented in Table 1.

### Table 1: Knowledge and skills set

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>1</td>
<td>Understand the importance and relevance of health and safety at scenes and that this may vary on a case by case basis.</td>
</tr>
<tr>
<td>2</td>
<td>Understand the importance of a structured, systematic methodological approach to fire scene investigation and excavation including the documentation (e.g. written, photographic) of the scene investigation including the documentation of potential evidence <em>in situ</em>. Understanding the importance of evidential integrity and chain of custody.</td>
</tr>
<tr>
<td>3</td>
<td>Be aware of aspects of fire science and fire engineering which may have a relevance to fire investigation (e.g. smoke spread, structural performance, passive and active fire protection systems, fire tests, and human behaviour in fire).</td>
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<tr>
<td>4</td>
<td>Understand the mechanisms of heat transfer.</td>
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<tr>
<td>5</td>
<td>Understand the physical chemistry of materials and how this influences the reaction of materials when exposed to heat.</td>
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<tr>
<td>6</td>
<td>Understand the differing types and mechanisms of ignition.</td>
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<td>7</td>
<td>Understand the chemical properties of solid, liquid and gaseous fuels as they relate to their thermal decomposition including pyrolysis and combustion and how such materials will react when exposed to heat.</td>
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<tr>
<td>8</td>
<td>Understand the mechanisms and influencing factors of fire growth and development in a wide range of circumstances.</td>
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<td>9</td>
<td>Understand the interpretation of post fire indicators (including their limitations) and the use of such indicators in the determination of the area of origin of a fire.</td>
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<tr>
<td>10</td>
<td>Understand the potential involvement of electricity as a cause of fire and awareness of the post fire indicators of electrical involvement including for example the potential application of techniques such as arc fault mapping.</td>
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<tr>
<td>11</td>
<td>Be aware of the importance of the examination of fuses and electrical appliances and the appropriate means of securing electrical appliances post fire</td>
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<td>12</td>
<td>Be aware of diffuse phase explosions and gas explosions including the pattern of damage.</td>
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<tr>
<td>13</td>
<td>Understand the factors which may contribute to fire fatalities including aspects such as toxicity of products of pyrolysis and combustion.</td>
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</table>
14. Understand the procedures relating to the recovery of items from fire scenes including the importance of continuity and integrity of evidence.

15. Understand the requirements for contamination control, appropriate packaging materials required and the importance of control and comparison samples in the collection of fire debris suspected to contain ignitable liquids.

16. Be aware of the wider forensic science fields which may be encountered in fire investigation (e.g. crime scene investigation, forensic biology, toxicology, forensic anthropology, forensic archaeology) and the requirements of such specialists within the investigative framework.

17. Keep an accurate and true record of casework, to write reports and/or statements appropriate for the UK criminal justice systems, to give testimony and in doing so, communicate detail of their involvement in the case and conclusions, in a clear, unbiased and appropriate manner.

18. Understand the UK criminal justice systems and in particular the rules of evidence, the obligations of being a witness, including acting as an expert witness.

5. **ESTABLISHING REQUIREMENTS** (ISO/IEC 17020:2012:7, NOS SFJFI1, SFJFI2)

5.1 A briefing must normally take place where the fire investigator is informed by the investigating authority about the nature of the incident and any background information that may be of relevance. The content of the briefing must be recorded in the fire investigator’s notes.

5.2 Any conflicts of interest or perceived conflicts of interest must be declared and discussed. The terms of reference must be clearly stated prior to commencement of the fire scene investigation. This may be for example via a forensic strategy meeting or an initial instruction either in person, by telephone or in writing from the investigating authority. It is recognised that establishing clear instruction is a dynamic process that requires incontrovertible communication between the relevant practitioners and that in cases where the fire service instigates the investigation, such a pre-investigation meeting may not always occur.

5.3 The terms of reference for the fire scene investigation should include:

1. information relating to the purpose of the requested examination, the expertise required and if appropriate, the timeframe and agreed cost
2. the availability of suitable resources, facilities, specialists or other equipment (e.g. aerial platform)
3. establishing a reflective review point for evaluation of progress or changes in priority against requirements in light of information received.
4. discussion and agreement of any limitations imposed on the investigation as a consequence of health and safety risk issues and necessary control measures.

6. CASE ASSESSMENT

Fire investigators attend many different types of scenes including those where explosions or fatalities may have occurred. Because of the variety of scenes, other forensic practitioners and other specialists may also be a part of the investigative team and the fire investigator should familiarise themselves with, and provide input to, the investigative strategy applicable to the scene being investigated.

6.1 PRIOR TO INVESTIGATION AT THE SCENE (NOS SFJFI1, SFJFI2)

1. On arrival at the scene, the fire investigator should introduce themselves to the point of contact and other members of Police or fire and rescue service staff and be prepared to show appropriate identification assuming that these practitioners are already in attendance. The fire investigator must note the names of the key people involved in the investigation and their role and work alongside the other investigative agencies in accordance with the agreed strategy. They must also establish the legal power under which they are operating (for example having written authorisation if required).

2. Prior to any work being undertaken, the fire investigator must discuss and agree any limitations imposed on the investigation as a consequence of health and safety risk and necessary control measures and take responsibility for their own health and safety. The scene risk assessment should be documented.

3. The fire investigator must record the scene perimeters, cordons, logs and common approach paths if in place and must ensure that they adhere to these.

4. If possible, the initial fire scene investigative strategy must be outlined and agreed between the investigating authority, crime scene manager or their representative and other specialists present, being mindful of the potential for recovery of other types of evidence.

6.2 SCENE INVESTIGATION (ISO/IEC 17020:2012:7, NOS SFJFI1, SFJFI2)

6.2.1 It is recognised that scene investigation is a dynamic activity and as such the investigative strategy must be reappraised regularly and communicated to all relevant parties as the scene investigation progresses.

6.2.2 The fire investigator must record their actions, decisions and observations, strategy, processes, any exhibits/productions seized, etc. Records should include scene notes, scene plans and wiring diagrams as appropriate,
supported by photography (if permitted). Field recording forms may be used. All documentation must be retained and all such notes must be made available for disclosure purposes.

6.2.3 Any equipment brought to the scene by the fire investigator must be clean and contamination free. The cleaning and monitoring of equipment must be recorded in accordance with the requirements of RG201:6.2

6.2.4 Any limitations imposed on the findings by the fire investigator as a result of restricted access at the scene (e.g. for safety reasons) should be recorded.

6.2.5 The fire investigator must follow and document a systematic data gathering and investigative approach to the scene investigation which is accepted by the profession as good practice and widely referred to as the ‘scientific method’. This includes, but is not limited to:

1. a preliminary external examination of the scene
2. a preliminary internal examination of the scene
3. a detailed external examination of the scene
4. a detailed internal examination of the scene
5. a scene reconstruction

Preliminary examinations must;

1. provide a set of overview photographs of the scene,
2. provide the fire investigator with an initial perspective of the scene, identify items of potential evidential relevance relating to the origin, cause and development of the fire as well as the identification of other potential evidence,
3. identify information which may need to be gathered from potential witnesses or other sources (for example CCTV).

Detailed examinations must;

1. identify and protect items of potential forensic evidence so that an assessment can be made of their relevance and that they can be recovered by other practitioners competent to do so,
2. document, record, retrieve and package items appropriately within their area of competence and in discussion with the investigating authority or crime scene manager,
3. interpret the physical post fire indicators at the scene systematically to identify the potential area of origin being mindful that there may be more than one such area,
4. undertake a systematic and fully documented excavation as appropriate to the scene and in line with the requirements of the investigation and agreed terms of reference.

6.3 Retrieval of items from the scene (RG201:7).

6.3.1 Preservation, packaging, labelling and documentation

1. The fire investigator must have permission from the investigating authority to recover and remove items from the scene. Prior to
removal of such items, they must be fully documented including *in situ* photography, with a scale where appropriate.

2. Items must be packaged suitably and labelled independently such that each item can be unequivocally identified. This must be done in accordance with the requirements for sample integrity and continuity of evidence such that a chain of custody is in place. Any deviation from appropriate packaging material shall be documented along with the reason for the deviation.

3. The potential for contamination and cross contamination must be assessed on an item by item basis and all possible safeguards put in place and documented to minimise the possibility of contamination.

4. All package containing recovered items must be sealed at the scene.

5. A list of items recovered from the scene must be kept including recording who has responsibility for the items. These records shall include details of when the items have been handed over to the investigating authorities.

6.3.2 *Transfer and transportation*

1. The fire investigator must ensure that they witness the handover of items recovered from the fire scene to another person or organisation and ensure there is a written record of this within their notes.

2. Any damage or potential for contamination during retrieval and/or transportation of items from the scene must be documented.

6.4. Examination of items retrieved from the scene

1. Examination of items (for example electrical appliances) must be undertaken, once the prioritisation of other evidence such as DNA and fingerprints has been fully discussed with the investigating authority.

2. All relevant practitioners (for example practitioners engaged for the prosecution, defence or insurance industry) should be notified by the fire investigator undertaking the examinations that such examinations are taking place and be provided with the opportunity to attend.

6.4.1 *Anti-contamination precautions (RG201)*

1. Examination of items recovered from fire scenes must be undertaken in a well-lit and clean environment. Benches must be cleaned with detergent prior to such examinations taking place.

2. Appropriate personal protective clothing including gloves must be worn.

3. Equipment must be cleaned with detergent prior to and following the examination of any items and this must be documented.

6.4.2 *Examination*

1. The condition of packaging must be recorded and fully documented.

2. The fire investigator must be aware of the potential needs of the defence or other experts when undertaking the examination of items
and ensure that adequate and accurate documentation including photography is carried out prior to any destructive processes being undertaken.

3. Care must be used in handling more fragile items given that damage may occur during the examinations and when this does occur, it must be documented.

7. REVIEW OF CRITICAL FINDINGS

Critical findings are those which make a significant contribution to the finding in the case and can be subject to differences in interpretation by individual fire investigators.

1. All proposed hypotheses for the origin, cause and, if required, development of the fire and/or explosion must be stated.
2. Each hypothesis must be evaluated and the conclusions reached must be justified in light of the case circumstances and interpretation of physical evidence observed and recorded at the scene including subsequent laboratory examinations if applicable.
3. Critical findings and conclusions must subject to peer review.

8. UNDERTAKING CASE REVIEWS (NOS SFJFI1, SFJFI2, SFJFI3)

8.1 In some circumstances fire investigators may be asked to undertake a review of case related materials such as photographs, fire investigation reports, witness statements and other documents.

8.2 Instructions may be provided by the investigating authority either in person, in writing or by telephone. In all cases the fire investigator must document:

1. The name and contact details of the instructing authority.
2. The terms of reference.
3. An agreement of the items to be reviewed.
4. The time scales under which the case review will be carried out.
5. An agreement of costs.

8.3 Should there be any conflict of interest, the fire investigator must discuss this with the instructing authority.

8.4 A list of material required from other experts must be passed to the relevant individual (for example the disclosure officer or defence solicitor) at the earliest point to allow them to locate and pass on material which might be pertinent.

8.5 The fire investigator undertaking the case review for the defence must understand the different requirements in relation to disclosure related to the work that they are undertaking.

8.6 Limitations imposed on the conclusions drawn by the fire investigator as a result of the method of examination of the evidence (photographs, written
notes and reports) or as a result of restricted access at the scene (e.g. for safety reasons) must be communicated to the instructing authority.

9. **CASE MANAGEMENT**

9.1 A review must be undertaken to check that the investigating authority’s requirements have been adequately addressed in accordance with the terms of reference.

9.2 All reports or statements must be peer reviewed prior to submission to the investigating authority.

10. **REPORTING**

1. The report must be signed and dated on each page prior to submission.
2. Draft documents must be marked as such and left unsigned.
3. The report must be clear and easy to read. The summary and conclusions of the report must be easily understood by the layperson, to render it suitable for presentation in court. The use of technical terminology must be kept to a minimum with non-technical explanations of these terms given where they are felt to be essential.
4. The report must contain sufficient detail and precision for other fire investigators to be able to comprehend the significance of the results.
5. The report must make clear any assumptions made and/or limitations on the extent or reliability of the evidence assessed, and the significance of this on the results.
6. The fire investigator must not stray outside her/his area of expertise when writing the report.
7. The report may include any relevant illustrations including a scene diagram and a selection of photographs.

10.1 **Report format and sections**

10.1.1 Many fire investigators will have their own reporting formats and standard operating procedure for reporting their investigations and findings.

10.1.2 Where such formats do not exist the report should include some or all of the following sections:

1. Introduction,
2. Background,
3. Details of the scene investigation undertaken,
4. Findings including assumptions and limitations,
5. Discussions and conclusions including considerations of all relevant hypothesis,
6. Non technical summary if required
10.2 Final review and checking
Before signing and submitting the report it must be checked for typographical and grammatical errors. A critical check on the conclusions through a peer review process must be undertaken to ensure that
1. there is consistency within the report
2. any conclusions drawn are justifiable considering the information contained within the report
3. the report is a complete and stand-alone document

10.3 Submission
1. The report should be produced as quickly as is practical within the specific circumstances of the case and within the agreed timescale.
2. Interim and supplementary reports may also be requested and the fire investigator must provide these.
3. If there are any delays in producing the requested reports the instructing authority should be informed.

10.4 Storage and archival of material
All materials pertinent to the case must be stored and archived securely. This must include all unused material, for example written notes and photographs. An Index of unused material should be compiled.

11. CASE RELATED CONFERENCES
The fire investigator must be prepared to:
1. Attend case conferences or meetings called by the instructing authority to discuss their findings, report or any other issues relevant to the case.
2. Discuss their findings and interpretations openly and in an unbiased manner including details of any further work which may in their view be required. They should be in a position to discuss alternative hypotheses given the facts provided and identify and summarise any areas of disagreement.
3. All such discussions should be documented fully.

12. DISCLOSURE (NOS SFJFI2, SFJFI3)
The fire investigator must ensure that they adhere to the obligations placed upon them in relation to the disclosure of used and unused materials within the jurisdiction within which they are practicing.
13. ATTENDANCE AT COURT (NOS SFJFI2, SFJFI3)

13.1 The fire investigator must make themselves available to attend court when requested to do so.

13.2 They must understand the obligations that they have to the court and the UK criminal justice systems.

13.3 In particular they must:

1. Ensure that they are well prepared and have reviewed their contemporaneous notes and report in advance to their appearance in court to give their evidence.
2. Ensure that all relevant documentation, such as a copy of their report and contemporaneous notes, are taken to the court.
3. Ensure that their appearance and behaviour is in accordance with standards expected by the courts.
4. Deliver all evidence in a clear, audible, and comprehensible manner. They must avoid using overly technical language when answering questions and offer explanations for such language if required.
5. Ensure a clear delineation between what is factual evidence and what is opinion evidence.
6. Ensure that testimony given is in accordance with the contents of their written report.
7. Answer questions truthfully and impartially.
8. Consider any alternative hypotheses that are presented to them, particularly in light of new facts which may emerge during the conduct of the trial.
9. Ensure that any conclusions and statements given are within their field of expertise.
10. Attempt to bring to the attention of the court any evidence which appears to have been misunderstood or misstated by a lawyer.
11. Be willing to enter into discussions with other specialists prior to attendance at court, with regards to confirming areas of agreement and/or to explore any differences in opinion that exist regarding findings and conclusions.
12. Be prepared to change their opinion if the facts dictate it, and to state this change clearly to the court.

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