GKA
ANALYTICAL SERVICES
committed to truth

ASSESSING LABORATORY COMPETENCY

FIRE DEBRIS ANALYSIS: HOW COMPETENT IS YOUR LABORATORY?

Concluding that a fire was deliberately started is a major decision for a fire investigator to make – the implications can be profound, sometimes resulting in significant and lasting economical and personal impact.

It therefore can't be overstated how important the accuracy of an investigation is.

Imagine you are examining a suspicious house fire and you're not able to locate an ignition source. You then notice unusual burn patterns on the floor so take some samples and submit them for analysis. The laboratory reports that petrol was present in the sample and, as a result, you report that the fire was deliberately set.

Several months later CCTV footage emerges from the site that clearly shows the fire starting accidentally. The unusual burn patterns on the floor were created by falling debris and there was never any petrol present at the scene.

So, what happened and why was the fire thought to be deliberate?

The laboratory had mistakenly determined that there was petrol in the sample of flooring. Several factors led to this: they had limited expertise in fire debris analysis and mistook common pyrolysis products for components of petrol; they did not have a peer review process in place to check the accuracy of their results; and they lacked any quality controls to ensure their instrumentation was working properly.

Because of the laboratory's incompetence, the client is now questioning your expertise and you may be liable for the mistaken report. In fact, every report from that laboratory might be erroneous and would now need to be reviewed.

Situations like this can and do happen - highlighting the importance of reliable analytical testing and the need to use a competent laboratory.

TAKE RESPONSIBILITY

It's in every forensic examiner's interests to protect their professional integrity, take responsibility and do their own due diligence on laboratories to ensure exceptional standards.

It is simply not worth cutting corners. Whether your choice is due to familiarity, cost or timing, an erroneous decision can have lasting implications and a forensic investigator is only as good as their results.

WHAT CONSTITUTES A CREDIBLE LABORATORY?

The General Insurance Code of Practice states that insurance companies will only appoint service suppliers who:

"reasonably satisfy us at the time of appointment that they are […] qualified by education, training or experience to provide the required service competently…"

DO YOUR DUE DILIGENCE

1. Is the laboratory accredited by NATA?

Only use National Association of Testing Authorities (NATA) accredited labs, with ISO/IEC 17025 accreditation. *Flammable liquids* must be listed as a *Determinant* on the laboratory's Scope of Accreditation.

2. Are standardised methods followed?

ASTM International standards represent best practice and ASTM E1618 is the standard test method for identifying ignitable liquid residues in fire debris. ASTM standards for extraction and analysis of samples should also be followed.

3. Does the laboratory have written procedures?

View the laboratory's own procedures detailing its methods.

4. What instrumentation and equipment are used?

Techniques based on gas chromatography-mass spectrometry (GC-MS) are the standard for identifying ignitable liquids in fire debris. Gas chromatography (GC) alone is no longer an accepted identification technique.

5. What is their limit of detection?
Detection of ignitable liquid volumes of less than 1 µL (microlitre) should be easy.

6. Are the analysts qualified?
Degrees in chemistry, forensic science, or related areas are a minimum, plus specialist fire debris analysis training. Ideally memberships of industry associations, such as the Royal Australian Chemical Institute (RACI), Australian Academy of Forensic Sciences (AAFS), or the Australian and New Zealand Forensic Science Society (ANZFSS).

7. Have the analysts published peer-reviewed articles?
This is the hallmark of a professional forensic scientist.

8. Are laboratory results peer reviewed?
Laboratory reports should be reviewed by a second qualified analyst before release. This ensures quality and consistency.

9. Do they participate in proficiency testing?
A form of quality assurance – ask to view their latest proficiency test results.

10. Is the laboratory transparent in their client dealings?

Look to see how analysis is conducted and samples handled. View the quality manual, standard procedures, or even case notes for an anonymised file.

11. What are the laboratory's chain of custody standards?

When dealing with forensic evidence, chain of custody is paramount. See how it's managed and what the procedures are.

12. How often does the laboratory encounter samples of fire debris?

Fire debris analysis is a niche field and a laboratory receiving less than 100 samples a year is unlikely to be experienced enough. Ask for references from fire investigators.

13. Is fire debris analysis the laboratory's primary business activity?

Fire debris is highly specialised and requires dedicated staff and equipment to facilitate. Labs that are too busy or struggling with fire debris evidence may ask for subsets of samples to reduce workload. Evidence will be missed this way. GKA Analytical Services analyses 100% of submitted samples.

14. Does the laboratory take steps to reduce cognitive bias?

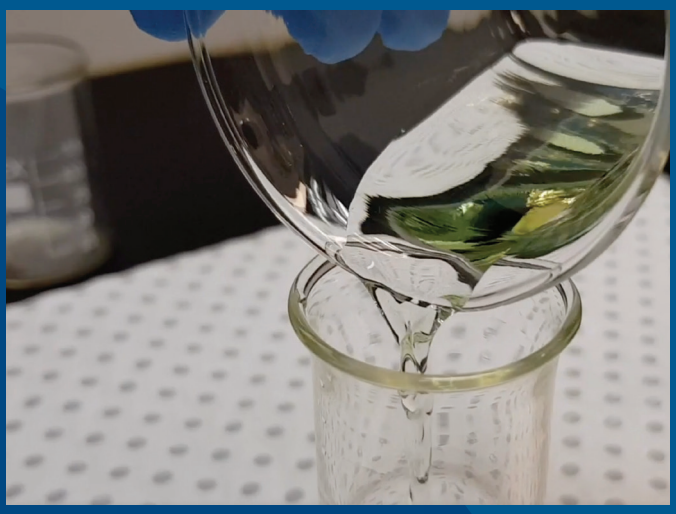
This can impact an analyst's thought processes and potentially invalidate test results unless counteractive procedures are in place. Beware of labs that analyse samples from mostly deliberate fires – their perception of "normal" samples may be skewed.

15. How quickly does the laboratory return analysis results?
It shouldn't take longer than a week.

16. Is the laboratory insured?
Verify the laboratory's Certificate of Insurance.

How does your laboratory compare? GKA Analytical Services offers:

NATA accreditation	✓
Standarised methodology	✓
Written procedures	✓
Specialist equipment	✓
Detection limits	✓
Qualified analysists	✓
Published scientific articles	✓
Published peer-reviewed results	✓
Proficiency testing	✓
Transparency in customer dealings	✓
Chain of custody assured	✓
Fire debris analysis experts	✓
No cognitive bias	✓
Quick turnaround	✓
Insured	✓



GKA Analytical Services' Fire Debris Analysis laboratory is **accredited by NATA**, to ISO/IEC 17025, providing an unrivalled assurance of technical competence and expertise in all aspects of forensic examination and laboratory procedures and management.

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