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Forensic Labs: Shattering the Myth

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Have you seen these kind of forensic laboratory reports?

The powder is cocaine.

DNA at the crime scene matches your client.

Analysis of your client's urine showed recent use of heroin

Your client's blood alcohol level was 0.12 g/dl.

Cloth fibers that match your client's shirt were found in the victim's bedroom.

The evidence seized from your client's car includes 125 grams of methamphetamine.

A hair matching the decedent's hair was found on the front end of your client's vehicle.

Flammable liquids were detected at the fire's point of origin, and on your client's shoes.

Do you stipulate to the evidence? Do you subpoena the examiner for questioning? Even if you do, are the underlying data that support the

laboratory's reported conclusions ever subjected to independent scrutiny? All too often, forensic evidence is accepted at face value. Yet even where the test method meets *Daubert*[1] criteria, the method as performed by the laboratory may be flawed. Perhaps attorneys are unaware that forensic laboratories can — and do — make serious errors during the testing process. Perhaps they are unaware that laboratory test results can be subject to valid and compelling technical challenges. Or perhaps attorneys simply don't have the necessary scientific or financial resources. For whatever reasons, counsel are often unprepared, unwilling, or unable to investigate and assess the scientific validity and technical pedigree of forensic evidence. In almost any industry, it would be a serious lapse of due diligence to simply accept and use test laboratory results without question. In the case of forensic laboratories, it can result in a miscarriage of justice.

Principle v. Practice

In principle, forensic laboratories operate in an objective and scientifically sound manner to consistently generate unbiased data that are accurate, technically defensible, and thoroughly documented. Would that it were so. Although this theoretical world is a reasonable goal, and although many laboratories strive to achieve it, it does not represent today's reality.

Within the last couple of years, the criminal justice community and the public at large has been rocked by revelations that forensic laboratories are not necessarily bastions of objective and competent science.

FBI Laboratory: Frederic Whitehurst, Ph.D. was a Supervisory Special Agent in the FBI Laboratory in Washington, DC. As the laboratory's senior explosives analysis expert, he repeatedly raised concerns about shoddy work, unqualified laboratory personnel, and improper testimony by laboratory examiners. Despite the fact that internal investigations concluded that there were no problems, in response to Dr. Whitehurst's continuing allegations of serious misconduct, the Department of Justice Inspector General conducted an investigation of 3 of the laboratory's 23 units. The IG's findings shattered the laboratory's aura of infallibility. The IG report issued in 1997[2] identified long-term systematic problems, including scientifically flawed and inaccurate testimony, fabrication of test results, unqualified examiners, and management's failure to resolve serious and credible allegations of incompetence.

California Forensic Laboratories: In 1997, a team of consultants evaluated the seven forensic laboratories operated by the California Department of Justice.[3] They found that the laboratories were in deplorable condition, with serious concerns about evidence handling, cross contamination and security. In 1998, the California Bureau of State Audits conducted an evaluation of 19 local forensic laboratories.[4] They found that many laboratories did not have essential elements of quality control systems and

proficiency testing programs. They also found training was inadequate, and equipment was obsolete or malfunctioning.

Fred Zain: Fred Zain is an embarrassment to the forensic profession and the criminal justice system. In 1993, in response to a petition from a County Prosecuting Attorney, the West Virginia Supreme Court ordered an investigation of the Serology Division of the West Virginia State Police Crime Laboratory, which had been headed by Trooper Fred Zain. The investigating judge concluded that Zain's pattern and practice of misconduct completely undermined the validity and reliability of any forensic work he reported.[5] In 1989, Fred Zain left West Virginia to accept a position as the chief forensic serologist in the Bexar County Forensic Science Center in San Antonio, Texas. Until he was fired in 1993 (after the West Virginia report was made public), Zain was in charge of physical evidence for the laboratory. In May 1999, an independent quality assessment of serology casefiles from the laboratory was performed by this author for Stanley Schneider, a defense attorney in Texas. The report concluded that the Bexar County laboratory had serious, systematic, and long-standing problems that severely compromised the validity and defensibility of all its reported results. None of the laboratory's reported results could be substantiated by contemporaneous records. This callous disregard for the validity of forensic evidence was the norm in a state that epitomizes the death penalty and performs more executions than any other. But it doesn't end there. In June 1999, the West Virginia Supreme Court reopened the investigation of the West Virginia State Police Crime Laboratory to determine whether the laboratory's misconduct extended beyond Zain's performance.

Guy Paul Morin: In Ontario, Canada in 1992, Guy Paul Morin was convicted of first-degree murder, largely on the basis of hair and fiber evidence reported by the Centre of Forensic Sciences. In 1995, Morin was exonerated on the basis of DNA testing. An independent judicial commission[6] evaluated the case and determined that contamination, incompetence, and unethical actions by laboratory personnel contributed to the wrongful conviction of an innocent defendant. The commission investigated the underlying causes for the failures in this case, identified serious systemic issues in the administration of criminal justice, and made more than 100 recommendations for system-wide changes intended to prevent future miscarriages of justice.

Bokin: In a May 1999 ruling,[7] a California Superior Court judge ruled that a key DNA test used by the San Francisco Crime Laboratory since 1997 (also used in other laboratories) could not be allowed in five murder and rape cases, because the prosecution did not prove that the procedure had been validated to demonstrate the reliability of the specific techniques used.

Drug Lab Fraud: In 1994, a technician in the San Francisco crime laboratory did not perform confirmatory tests, as required to conclusively identify controlled substances. This resulted in the Public Defender's challenge to overturn several years of felony drug convictions that were obtained as a result of more than 1000 cases of evidence examined by this technician. A veteran chemist in the Dallas DEA Laboratory was suspended in 1996 after admitting that for many months, if not years, she had been reporting results and providing testimony for controlled substance tests that were never performed.[8]

O.J. Simpson: The O.J. Simpson trial raised serious questions about deficiencies in evidence collection and handling, the operation of the Los Angeles Police Department crime laboratory, and the operation of the FBI Laboratory. The reliability of forensic evidence suffered a loss of public trust as a result.

Innocence Project: The recent use of DNA evidence to exonerate dozens of persons who were wrongly convicted has been a double-edged sword for the forensic community. While the advent of DNA testing has allowed the criminal justice system to right past wrongs, it has also cast doubt on the validity of forensic practices. In *Convicted by Juries, Exonerated by Science,*[9] the authors reviewed 28 cases in which convicted persons were released from prison as a result of post-trial DNA testing of evidence.

These laboratory failures may appear to be isolated and unrelated. They are not. The problems in these high-profile cases are a clear reflection of the forensic community's widespread failure to develop and implement effective quality assurance programs.

From a quality assurance perspective, these cases share a number of common threads. First, the existence of serious problems was generally not recognized, acknowledged, and acted upon until it was identified by someone outside the laboratory.

Next, the laboratories were unable to prevent serious problems from occurring. Because these forensic laboratories lacked rigorous quality assurance programs, they were not effectively monitoring the performance of their own systems.

Finally, the systemic problems that were identified in these forensic laboratories are the predictable outcome of laboratories that perform production-scale testing without benefit of a strong and effective quality assurance program. Practicing good science on a day-in and day-out basis requires more than simply disciplinary knowledge and individual initiative. For decades, the scientific community has recognized that a production laboratory needs formal systems, controls, and processes to institutionalize

the practice and documentation of good science. In the absence of quality assurance programs, you can expect the types of problems that have been found in forensic laboratories:

- poor control of contamination and environmental conditions;
- ineffective internal technical reviews;
- inadequate documentation of laboratory work;
- inappropriately trained or unqualified analysts; and
- a complete lack of independent oversight and monitoring.

An Introduction to Laboratory Quality

Outside the scientific establishment, laboratory results are often believed to be "answers." In fact, laboratory measurements of unknowns are only estimates of the true values. Laboratory analysis of an unknown material *always* involves a degree of uncertainty. However, if a laboratory's measurement system is operated in a state of statistical control, and if all elements of a laboratory's system are carefully controlled, monitored, and documented, it is possible to evaluate the quality and reliability of the reported results.

International quality standards have been adopted by laboratories in diverse industries to promote confidence in test results, and to demonstrate competence in specific areas of testing. "General Requirements for the Competence of Calibration and Testing Laboratories" (ISO/IEC Guide 25),[10] is used by many different industries as the quality standard that sets minimum requirements for laboratory accreditation.[11] It represents the international consensus regarding the *minimum* systems and practices that a laboratory must use in order to ensure consistent production of results of appropriate quality.[12] In most industries, the system requirements and technical requirements of Guide 25 are only a starting point for laboratory accreditation. Various industries amplify and interpret requirements as necessary and appropriate to each individual discipline.

Quality in Forensic Laboratories

Make no mistake about it; many of the individuals who labor in private, state, local, and federal laboratories are talented, ethical, and capable forensic scientists. Nothing in this article should be viewed as a blanket condemnation of forensic scientists. However, the quality of a laboratory's work product depends on more than the technical ability of individual scientists. Experience has shown that consistent production and reporting of high quality results depends on a carefully designed, comprehensive and technically rigorous quality assurance program. Yet, in our nation's forensic laboratories, scientists and laboratory managers can complete their careers without a practical understanding or formal experience with quality assurance.

A majority of the forensic laboratories in the United States are not accredited, and have not made the commitment to comply with consensus quality standards. It appears that regardless of accreditation status, forensic laboratories have never been subject to independent on-site quality audits.

The current situation, in which forensic laboratories operate without independent oversight, is intolerable. It represents a systematic failure by the criminal justice system to demand compliance with quality standards, and that the work of forensic laboratories be subject to independent quality assessment. In no other industry are laboratories shielded from independent oversight.

Accreditation: Gold Star or Red Herring?

The American Society of Criminal Laboratory Directors, Laboratory Accreditation Board (ASCLD/LAB) has established the only national program directed toward the evaluation and accreditation of forensic laboratories.[13] A committee of crime laboratory directors prepared a manual of accreditation criteria,[14] and designed ASCLD/LAB as a voluntary program. If a laboratory chooses to pursue accreditation, they are evaluated by a team of forensic laboratory managers who volunteer their services as inspectors. At this writing, a total of 181 laboratories (165 in the United States) are accredited by ASCLD/LAB. Also at this writing, 20 states do not have a single accredited crime laboratory.

Although ASCLD manages the only national accreditation program for forensic laboratories, it is neither a technically strong, nor a truly independent program. First, consider the issue of independence. The ASCLD/LAB is essentially a trade organization of crime laboratory directors. The membership of the ASCLD/ LAB delegate assembly consists solely of the laboratory directors of ASCLD accredited laboratories. The latest published list of ASCLD inspectors includes 234 representatives from forensic laboratories with prosecutorial affiliations (federal, state, or local) and three representatives from the private sector (two located overseas, and one from a commercial DNA vendor). This peer-to-peer composition of ASCLD Inspectors creates the potential for conflicts in the close-knit forensic community. If an Inspector is perceived as being too rough on a laboratory, it could limit his or her career opportunities at sister laboratories. Or consider the fact that representatives from the laboratory that I audit today may show up on my doorstep next month to audit my laboratory.

In considering the technical rigor of the ASCLD accreditation program, it is useful to compare it to international standards. ISO/IEC Guide 25 describes requirements for quality management systems and technical operations within a laboratory. None of the requirements are considered optional. To comply with this international standard, laboratories must

comply with every requirement. In contrast, the ASCLD/LAB standard does not address, or gives very limited attention to, many of the Guide 25 requirements. The lack of rigor in the ASCLD program is also reflected in the fact that only 53 percent of the criteria in the *ASCLD Manual* are considered mandatory.

Given the importance of what is at stake, it is an ironic and sad commentary on the state of forensic quality that the quality standards used by wastewater laboratories are dramatically more stringent than those used by forensic laboratories.[15]

How Are Problems of Quality Found?

Internally: Through Quality Assessments
If a laboratory has an effective quality assurance program, their internal systems are likely to find most of their technical problems. But in general, our nation's crime laboratories have immature and ineffective quality assurance programs. Don't depend on them to find their own problems.

Internally or Externally: Through Proficiency Testing
In a proficiency testing program, samples of known composition are sent to laboratories for testing, and each laboratory's reported results are scored. These programs provide an objective means to determine and monitor laboratory performance. However, because proficiency programs are conducted on an intermittent basis (*e.g.*, annually), and because laboratories generally know that they will be judged on their performance, they are not reliable indicators of routine performance.[16]

The only national study of crime laboratory proficiency was reported in 1995.[17] Despite the fact that the participant laboratories knew their reported results would be scored (implying a higher degree of care and attention), their performance was decidedly mixed. Poor performance was a matter of serious concern for several types of evidence, including fibers, paints, glass, hair, and body fluid mixtures. For these types of evidence, it appeared that laboratories were reporting improper comparative examinations in more than 10 percent of their reported results.

Externally: On Behalf of Data Users
In recent years, review by external parties has been the most effective means of identifying forensic laboratory problems. Given the ineffective nature of forensic quality assurance programs, independent assessments of forensic laboratory performance will continue to be the best line of defense for some time to come.

Where To Find Problems of Quality
If a case involves forensic evidence, the defensibility of reported results on the quality of the laboratory, the test method(s), and the casefile. If one or

more of these elements cannot be supported by laboratory records, the credibility and defensibility of the laboratory's report can be undermined. Some quality problems are specific to a particular type of testing, while others can occur throughout the laboratory. Specific examples of the types of quality assurance problems that can occur are provided below. You may recognize some of these examples as actual incidents from operating laboratories. (*see* 1. & 2. Laboratory Quality Issues.)

An independent on-site quality audit is the best means of assessing the quality of field and laboratory operations. However, crime laboratories and prosecutors may be reluctant to allow independent audits. Prosecutors who routinely try cases based on lab results they have never questioned may fear the implications if serious problems were to be identified. And if a laboratory has never been subject to independent oversight, management might be horrified at the prospect.

If an independent on-site audit is not possible, the next best option is to evaluate the scope and rigor of the quality assurance program through review of discoverable material (*e.g.*, Quality Manual, Standard Operating Procedures, Quality Procedures, internal audit schedules and reports, inventory of laboratory equipment, staff training records, etc.) Although less effective than an on-site audit, it is nonetheless a useful means of evaluating a laboratory's quality assurance program.

Method Quality

Even though evidence from a particular test method has been determined to be reliable and admissible under the applicable legal standard,[18] method quality remains an issue for forensic evidence. Despite the fact that the scientific community accepts a given measurement technique, it doesn't mean that every laboratory and every analyst is capable of successfully performing the method.

Before a laboratory uses any method to analyze forensic evidence, the laboratory should demonstrate and document its ability to successfully perform the method using the equipment and personnel in its facility. This is accomplished by performing a validation study to determine the performance characteristics of the method.

In the absence of a validation study, a laboratory that performs a test method does not have an objective basis for assigning uncertainties to its reported results. Even if performance data for a method are reported in the literature, they are not necessarily applicable to any individual laboratory's performance. If a laboratory has not determined a method's performance characteristics, it should not use the method to analyze forensic samples. Without a validation study, a laboratory doesn't know whether or not a method is working as it should. (*see* 3. Method Quality Issues.)

Casefile Quality

A laboratory casefile is the repository for records generated during the analysis of evidence from a case. It should be an internally consistent, unbroken chain of records that document all activities, observations, measurements, and results relating directly to evidence from a given case. It should provide sufficient detail, so that someone who is versed in the technique, but not involved in the laboratory's work, can understand what was done and the basis for the reported conclusions.

If a laboratory is able to provide a casefile with supporting documentation, independent disciplinary and quality assurance experts can assess the quality and defensibility of the reported results. They can determine whether the reported results are scientifically valid, and whether the reported uncertainties are supported by appropriate quality control data. They can also determine whether the reported results are supported by a complete and unbroken chain of documentation, or if there are gaps in the documentation trail that compromise the pedigree of the results.

If the documentation provided by the laboratory is incomplete or inconsistent, the defensibility of the data may be addressed during a preliminary hearing, or at trial. If a laboratory's reported results and their associated uncertainty cannot be technically supported on the basis of the laboratory's contemporaneous written records, the results should never be admitted as evidence. Counsel should file a motion to suppress the evidence based on the unreliability of the test results, even though the type of test is scientifically valid.

Just a note about the amount of information involved in a complete set of supporting information for a casefile: rather than considering units (pages of data), it may be more appropriate to refer to mass (pounds) or volume (square feet). Depending on the types of testing protocols required for a case, testing laboratories may generate *lots* of information. Don't be intimidated by the amount of material you receive. Despite the large quantities of paper and electronic information that may be provided, disciplinary and quality assurance experts know how to review the material and find the relevant information.

Six Steps to Put Quality Assurance Into Your Practice

Never stipulate to forensic evidence.

If you stipulate to a forensic report, you are buying into the big lie: that forensic laboratories are infallible. Never stipulate to forensic evidence.

Get a copy of the casefile and supporting information.

A forensic laboratory's report is never enough information for due diligence. Neither is it sufficient to rely on trial testimony from the laboratory's expert. There are simply too many ways that quality can be

compromised, and too much information for any individual to remember.

For an independent party to determine whether a laboratory's results and conclusions are valid beyond a reasonable doubt, you must have access to relevant laboratory records and supporting information. In the absence of contemporaneous laboratory records, an analyst's testimony is no more reliable (or verifiable) than **eyewitness** testimony. In science, you can't rely on an analyst's memory; the lab must be able to produce records that document the quality of its reported results.

Unless you have scientific training and laboratory experience, you will need to get the advice of disciplinary and quality assurance experts to determine what supporting information is needed for a given case. Supporting information from the laboratory should be sufficiently detailed and complete so as to enable an independent reviewer to construct the sequence, events, and decisions of the testing process. The required information includes documentation regarding the integrity of the evidence sample(s), the procedures used during testing, the qualifications of the responsible analyst(s), the traceability of standards and measurements, instrument operating conditions and maintenance, results obtained for unknown samples and known controls, and the assumptions and basis for any statistical analyses and interpretation of results.

Notwithstanding objections from the prosecution or the laboratory, it may or may not be a straightforward exercise to get all the information that is needed to assess the quality of forensic evidence. Given the historical tendency to accept forensic reports at face value, forensic laboratories have only rarely been asked to produce complete sets of supporting documentation. As a result, the systems necessary for controlled generation, storage, maintenance, and retrieval of laboratory records may not be fully developed or implemented. Even those laboratories that generated all the requested materials may be unable to retrieve them on request. From a quality assessment perspective, if the records can't be found, it is as if they never existed.

Get an independent assessment of the quality of reported results. After you get copies of all the available supporting documentation, you need to determine whether the laboratory's reported results are technically valid, and whether the quality and uncertainty of the reported results (reports and testimony) can be defended on the basis of the laboratory's records (written and electronic). If the supporting documentation provided by a laboratory is incomplete or inconsistent, the pedigree of the reported results is questionable, and the defensibility of the reported results can be compromised.

With the assistance of appropriate disciplinary and quality assurance experts, the review and assessment of case records should be tailored to the

composition and intended use of the casefile. Some of the general questions that should be addressed during the quality assessment process include the following:

- Were the laboratory's testing procedures scientifically valid?
- Were the methods as performed compliant with approved and validated procedures?
- Can the laboratory's activities, observations, and results be reconstructed solely on the basis of the available records?
- Did the laboratory comply with applicable elements of the quality assurance program?
- Were all measurement systems and instruments in statistical control at the time of analyses?
- Are the reported uncertainties consistent with validation and quality control results?
- Are measurements traceable through appropriate use of calibration, standards, and reference materials?

Examples of the types of issues that may be addressed during a quality assessment include the following.

Sample Quality and Integrity: The quality of a forensic measurement is limited by the quality and integrity of the evidence subject to analysis. It can be a daunting prospect to select, collect, package, label, transport, store, maintain, distribute, and prepare evidence in such a manner that the quality and integrity of the evidence are not compromised for any of the subsequent tests. For example, contamination of forensic evidence is a serious concern throughout the field and laboratory process. Opportunities for introduction of contaminants abound: untrained or inexperienced staff members can contaminate samples through poor contamination-control practices in the field or in the laboratory; facilities that are poorly designed, maintained, or managed can spread contaminants via air-handling systems, traffic patterns, or operating practices; and many laboratories do not have formal procedures to identify contaminant carryover between samples on analytical systems. It is worth remembering that unless you look for contamination, chances are you won't find it.

Re-process Raw Data: Most of the analytical systems that depend on electronic data processing allow the individual analyst considerable flexibility to edit data prior to generation of final results. In the hands of skilled analysts, the flexibility to manipulate data is an important and powerful analytical tool. However, this capability can also have unintended and potentially damaging consequences. Whether due to intentional bias or unintentional error, analysts may delete data that are inconsistent with the prosecution's case. In the most egregious cases of laboratory fraud, analysts have manipulated electronic files to generate data for samples that were

never analyzed. The only way to determine whether exculpatory results were edited or deleted during the analytical process may be to review and re-process the raw electronic data.

Qualifications of Responsible Analysts: Every individual who is involved in the analytical process can influence the quality of the results, and should have qualifications and experience commensurate with their responsibilities. From the technician in the field who collects the evidence to the forensic toxicologist in the laboratory who operates the gas chromatograph-mass spectrometer, *every* person involved in the analytical process should have objective evidence of their training, experience, and proficiency. As an example, instrumental analyses are often performed by highly qualified scientists, while sample preparation procedures may be performed by technicians with limited training. Despite the fact that the validity of sample collection and preparation is highly subject to individual skills, inquiries into staff qualifications are directed primarily toward scientists. Ironically, a greater risk to data quality may be poor lab and field practices by technicians.

A laboratory's successful participation in a proficiency testing program may be touted as a demonstration of qualification. Never accept such an assertion without reviewing the applicable criteria and the associated data. For example, it is not uncommon for individuals to fail proficiency analyses without any corrective action by the laboratory. Proficiency test results from two years ago are irrelevant in a current case if the laboratory changed its procedures in the interim.

Get an independent audit of field operations.
Evidence collection and management are often a weak link in the quality chain of forensic evidence. At best, a forensic laboratory test is only representative of the evidence as received by the laboratory. If evidence was compromised in the field, there is nothing the laboratory can do to correct the problem. The degree to which the test results can be interpreted within the context of a case depends on many things that may be outside a crime laboratory's direct control, such as: evidence collection equipment and techniques; statistical validity of evidence sampling; evidence transportation and storage conditions; skill and proficiency of evidence technicians; and ambient weather conditions at the collection site.

It is impossible to observe evidence collection practices for every case. However, it is possible to evaluate the quality of law enforcement's field operations through an on-site quality audit of field evidence practices. Such an audit would include reviews of operating procedures, training records, and field records, as well as in-field inspections of operational compliance with procedures and good field practices. An independent audit of field practices is one of the most effective means of determining whether effective contamination control procedures have been implemented.

Get an independent on-site audit of the laboratory.
Despite the fact that documentation can be a useful tool for assessing a laboratory report, only an on-site laboratory audit can provide a complete picture of a laboratory. It is one thing to have acceptable written procedures for a laboratory's activities. It is quite another to comply with the procedures on a daily basis. A laboratory quality audit is a systematic, independent investigation to determine whether a laboratory's activities and reported results comply with planned arrangements, and whether the activities are suitable to achieve the desired quality of results. An audit is not necessarily directed toward an assessment of laboratory performance on a particular case, although it is certainly possible.

An effective on-site quality audit should be performed by trained and experienced quality auditors who have laboratory testing experience. In order to avoid a conflict of interest or inadvertent bias, a forensic quality audit should be performed by auditors who are completely independent of laboratories with a prosecutorial affiliation. As independent parties acting on behalf of the users of forensic reports, the auditors should report not to the laboratory, but to the sponsoring entity that receives forensic reports.

This author was recently escorted on a brief courtesy tour of a respected, ASCLD-accredited laboratory. In a matter of only a few minutes, practices and deficiencies were observed that could seriously compromise the technical defensibility of associated results (*e.g.*, failure to check the validity of calibrations, lack of a written procedure for a blood alcohol determination, inability to correlate sample results with associated known controls, and use of expired standards). Given the severity and number of problems that were apparent during a brief walk through, an independent quality audit is warranted.

Know your laboratories.
You need to understand the strengths and weaknesses of the relatively small number of forensic laboratories that provide forensic services in your geographic area. In many locations, forensic laboratories are operated in substandard facilities by civil servants who are paid a fraction of the prevailing wage scale for trained scientists. A stellar record in one area of testing is no guarantee that all a laboratory's work is of comparable quality; a laboratory that excels in drug testing may do a dismal job on DNA. Laboratory management may be completely unaware that evidence is subject to serious contamination during laboratory operations. Laboratory examiners may be drawn from the ranks of law enforcement, and may lack any academic foundation or formal training in science. And in far too many cases, neither management nor the laboratory staff understand the type of quality assurance program that is necessary to consistently generate results that can withstand rigorous scrutiny and challenge.

Conclusions

Every forensic laboratory makes mistakes. Could it matter to your case if the laboratory's results can be shown to be invalid or insupportable?

The immaturity of forensic quality assurance programs means that the laboratories themselves are not likely to find and correct problems. It is up to you.

Quality problems won't show up in concise forensic reports; it takes disciplinary expertise and access to raw laboratory records to identify problems.

Independent quality audits and oversight of forensic laboratories are necessary to protect the integrity of forensic science.

Challenge forensic laboratories to defend and support their reported results on the basis of objective scientific evidence, documented results, and accepted quality control principles. Be an informed user of forensic reports by monitoring laboratory capabilities and performance. The critical evaluation of forensic evidence quality will provide greater service to your clients, and will ultimately serve as an impetus for improving the quality of forensic laboratory services.

Notes

1. Daubert v. Merrill Dow Pharmaceuticals, Inc., 509 U.S. 579, 113 S. Ct. 2786, 125 L. Ed 2d. 469 (1993).
2. *The FBI Laboratory: An Investigation into Laboratory Practices and Alleged Misconduct in Explosives-Related and Other Cases*, Office of the Inspector General, April 1997. Available at http://www.doj.gov/oig/fbilab1/fbil1toc.htm
3. 1997 Report commissioned by the California Department of General Services, conducted by Ehrlich-Rominger Architects, Inc. and Ruth and Going, Inc. Evaluation of seven of California's crime laboratories in the areas of functional efficiency, conditions of basic systems and infrastructure, security, caseload and staffing, and ability to address regulatory and ASCLD accreditation requirements. Available at: *http://www.kruglaw.com/dojrpt.htm*
4. California Bureau of State Audits, #97025, "Forensic Laboratories: Many Face Challenges Beyond Accreditation to Assure the Highest Quality Services" Dec. 1998. Available at *http://www.bsa.ca.gov/bsa/*
5. West Virginia Supreme Court Investigative Report, No. 21973. Available at: *http://www.truthinjustice.org/zainreport.htm*
6. 1998 Report to the Attorney General (Ontario, Canada) from the Commission on Proceedings Involving Guy Paul Morin. Available at: *http://www.attorneygeneral.jus.gov.on.ca /morin*
7. San Francisco County Superior Court, CA v. Bokin, SCN: 168461, filed May 6, 1999. Available at: http://www.scientific.org/distribution/archive/
8. *Hundreds of Drug Cases May Be in Jeopardy*, **Dallas Morning News**, July 19, 1996, page 34A, from staff and wire reports. Available at: *http://archive.dallasnews.com*
9. *Convicted by Juries – Exonerated by Science*, Edward Connors, Thomas Jundregan, Neal Miller, Tom McEwen, June 1996, U.S. Department of Justice, Office of Justice Programs, National Institute of Justice. Available at: *http://psych-server.iastate.edu/faculty/gwells/dnanijreport .htm*
10. ISO/IEC Guide 25 **General Requirements for the Competence of Calibration and Testing Laboratories**, Third edition, 1990, by ISO (International Organization for Standardization) and IEC (the International Electrotechnical Commission)
11. ISO Guide 25 (1990) is the international consensus quality standard that serves as the basis for accreditation of calibration and testing laboratories throughout the world.
12. ISO/IEC Guide 25 is currently under revision. Guide 25 will be replaced early in 2000 by a quality

standard, ISO 17025. This updated version of the standard for calibration and testing laboratories will include additional requirements designed to ensure that laboratories operate a quality system, are technically competent, and are able to generate technically valid results.

13. The terms “certification” and “accreditation” are often used interchangeably (and incorrectly) to refer to formal “qualification” of an individual or an institution by an external party. In practice, either individuals or institutions may receive a third party’s acknowledgement (either “certification” or “accreditation”) for a specific field of testing. Individual forensic scientists may hold “certifications” from one or more professional societies. At present, ASCLD/LAB administers the only program designed for accreditation of forensic laboratories on an institutional basis (i.e. the laboratory institution is the accredited entity). A list of accredited laboratories is available at *http://www.ascld.org*. A few forensic laboratories have sought certification from the Department of Health and Human Services National Laboratory Certification Program (NLCP), but the scope of this program is limited solely to testing urine for the presence of specific drugs of abuse.

14. **American Society of Crime Laboratory Directors, Laboratory Accreditation Board Manual**, January 1997. With Updates: Introduction page 6, November 1997; Glossary, November 1997; Appendix 1, November 1997; Appendices 8 and 10, February 1998; Appendix 9, September 1998.

15. ASCLD/LAB has stated its intention to revise the accreditation program to be compliant with ISO Guide 25. However, the current program is viewed as technically satisfactory by ASCLD and the forensic community. The planned revision to the accreditation program is not intended to increase the technical rigor of the program, but as “rewriting into ISO language” (statement by an unnamed ASCLD Board member).

16. The ASCLD/LAB accreditation program does not require forensic laboratories to participate in proficiency testing that is blind to the analysts. Although forensic analysts do not know the “true value” for a given proficiency sample, they are aware of the fact that a given sample is being used to assess their proficiency. Studies have shown that laboratory performance on this type of “open” proficiency program is consistently better than on a program where the identification of proficiency samples is blind to the laboratory.

17. *Crime Laboratory Proficiency Testing Results, 1978-1991, I: Identification and Classification of Physical Evidence, Peterson*, J.L. and Markham, P.N., **Journal of Forensic Sciences**, 40 (6), November 1995, 994-1008.

18. *Crime Laboratory Proficiency Testing Results, 1978-1991, II: Resolving Questions of Common Origin*, Peterson, J.L. and Markham, P.N., Journal of Forensic Sciences, 40 (6), November 1995, 1009-1029.

19. Daubert v. Merrill Dow Pharmaceuticals, Inc., 509 U.S. 579 (1993).

20. Kumho Tire Co., Ltd. v. Carmichael, __ U.S. __, 119 S. Ct. 1167, (1999).

21. Frye v. United States, 54 App. D.C. 46.

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