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The President of the United States  
The White House  
1600 Pennsylvania Avenue, NW  
Washington, DC 20500

Reference: Report Entitled "Forensic Science in Criminal Courts: Ensuring Scientific Validity of Feature-Comparison Methods"

Dear President Obama:

On behalf of the National District Attorneys Association (NDAA), the nation's largest prosecutor organization, representing 2,500 elected and appointed District Attorneys across the United States, as well as 40,000 assistant district attorneys, I write to you today regarding the Report to the President-Forensic Science in Criminal Courts: Ensuring Scientific Validity of Feature-Comparison Methods ("the Report"). The NDAA takes issue with, and has substantial concern about, the logic of the report and the manner in which it portrays several forensic disciplines.

First and foremost amongst NDAA's concerns is the pervasive bias and lack of independence apparent throughout the report. The report repeatedly contends that studies used to determine and/or establish the scientific validity of feature comparison disciplines must be conducted by entities independent of those who may have some stake in the outcome. The composition of the PCAST, however, violates this very principle; the PCAST membership included several who are far from "independent" and who have a direct "stake in the outcome." A significant example is Eric Lander, Co-Chair of PCAST, and Chair of the working group, who is also a Member of the Board of Directors of the Innocence Project, an organization that has argued for years that the forensic feature comparison disciplines have failed to demonstrate their scientific validity and are, in part, responsible for numerous wrongful convictions. There is no evidence the scientific basis for forensic feature comparisons are responsible for wrongful convictions.

Second, the working group (and PCAST at large) included no forensic scientists. Rather, it consisted of six PCAST members (none of whom have forensic laboratory experience), ten judges, two law school professors, and two college professors. In addition, the report does not include a bibliography/appendix of the literature upon which it relied on in support of its findings and conclusions. Instead, the report simply offers, in Appendix B, a list of (apparently hand-picked) "Additional Experts Providing Input." It is true that PCAST solicited literature references from various forensic organizations. The Report, however, does not indicate which of these the PCAST relied upon, considered or even read.

Third, without a single citation to scientific authority, the PCAST Report simply declares that forensic feature comparison methods belong to the scientific field of “metrology (including statistics).” Metrology is the study of scientific measurement. Crime labs use forensic metrology for determining the measurement of blood alcohol content, quantitation of drugs in a toxicology sample, weight of a controlled substance and the barrel length of a firearm. In light of this contention, it is inexplicable that the PCAST’s working group included **no** metrologists.

In their current form, the feature comparison methods considered in the Report clearly do *not* fall under the field of metrology. Labeling them as such was a transparently strategic attempt to bring these methods under the ambit of ***Daubert v. Merrell Dow Pharmaceuticals, Inc.* 509 U.S. 579, (1993)**, a requirement that “in a case involving *scientific* evidence, evidentiary reliability will be based on *scientific validity*.” The Report’s self-professed primary purpose was to define what *scientific validity* means.

According to PCAST, (again without citation to any literature or authority), *scientific validity* for subjective feature comparison methods can be established *only* through numerous, properly constructed, independent black box studies with a variety of samples from a diverse population of features. The report then posits that there is an insufficient number of these properly designed black box studies that comply with PCAST’s unilaterally imposed criteria to establish the scientific validity of several of the disciplines discussed. Based on that claim, the report then not-so-subtly urged that courts consider excluding results from these disciplines, while giving mere lip service to the notion that admissibility remains a question for courts, not PCAST, to determine.

By wrongly labeling the forensic feature comparison disciplines as belonging to the field of metrology, the report conveniently overlooks the ancient debate over precisely what constitutes “science.” The answer to this question depends fundamentally upon which philosopher one finds most compelling and which definition one finds most persuasive. (Indeed, the debate over exactly what constitutes “science” has been ongoing since the time of Aristotle and is far from settled.) Under many definitions, the feature comparison methods that are the subject of the report certainly incorporate *aspects* of science. These methods however, also *independently* constitute “*technical*” and “*specialized knowledge*” under Federal Rule of Evidence 702. Significantly, “*technical*” and “*specialized knowledge*” are *not* fields of knowledge for which *Daubert* requires *scientific validity*. See *Daubert*, fn. 8 (“Our discussion is limited here to the scientific context because that is the nature of the expertise offered here”; and fn. 9, “In a case involving scientific evidence, *evidentiary reliability* will be based upon *scientific validity*.”) (Emphasis original). In *Kumho Tire v. Carmichael*, 526 U.S. 137, 149, (1999), the Supreme Court recognized that distinction, holding that where the “factual basis, data, principles, methods (of technical or specialized knowledge) or their application are called sufficiently into question...the trial judge must determine whether the testimony has “a reliable basis in the knowledge and experience of [the relevant] discipline.”

Further illustrating the internal contradiction is the inconvenient truth that the same working group critics who have long argued that the feature comparison methods are *not* science *now* insist that they *are* in fact science. This change of heart, however, appears to have been driven solely by the strategic need to shoehorn these disciplines into *Daubert*'s holding that, in the case of scientific evidence, legal reliability is synonymous with *scientific validity*. Having completed this maneuver, the Report then imposes its own outcome-determinative definition of *scientific validity* on each canvassed method. Finally, the Report declares each one invalid due to an insufficient number of properly qualified black box studies that meet PCAST's newly-minted set of criteria. This is a transparent effort to persuade courts that they should exclude this technical or specialized evidence because it is not scientifically valid as required by *Daubert*. As elucidated by *Kumho Tire*, however, *Daubert* does not require *scientific* validity in the case of technical or specialized evidence, even if it incorporates scientific aspects.

### **Complex Mixture DNA**

In assessing the scientific validity of DNA analysis of single-source and simple mixture samples, the Report determines that as an objective method, each of the steps has been found to be "repeatable, reproducible and accurate." Thus, the authors correctly conclude that analyses of single –source and simple mixture samples of two individuals are an objective scientific method whose foundational validity has been properly and irrefutably established.

Moving onto the analysis of "complex mixture samples," the Report contrasts the analysis of such samples with the analyses of single-source and simple mixtures by suggesting that complex mixture analysis is not based on "precisely defined laboratory protocols" as single-source and simple mixture analyses are. Although it is certainly true that DNA interpretation rests solidly on a laboratory's protocols developed after conducting internal validation studies, such "precisely defined protocols" are by no means limited to single-source and simple mixture samples. Furthermore, non-probabilistic genotyping methods of DNA interpretation – whether of single source, simple mixture, or complex mixtures – requires some level of interpretation by a trained, well-qualified DNA analyst.

The Report challenges the DNA analysis of complex mixture samples and erroneously concludes that the Combined Probability of Inclusion (CPI) approach to complex mixture analysis is an inadequately specified, subjective method that is not foundationally valid.

From the outset, the Report paints with an overly broad brush in defining a "complex mixture sample." The Report defines a complex mixture as one with more than two contributors and states in entirely conclusory fashion that this type of mixture is inherently difficult to interpret. In defining complex mixtures so broadly, the Report fails to make a critical distinction between complex mixtures that have a discernable ratio of the various contributors – and therefore can be validly interpreted based on laboratory validation studies and standard operating protocols using a random match probability statistic, a likelihood ratio, or a CPI approach -- and those that do not have such discernable ratios.

DNA interpretations of complex mixtures with discernable contributor ratios are carried out daily by laboratories across the United States reporting accurate and reliable results. The Report ignores the fundamental difference between this type of complex mixture and those in which a greater-than-two-person mixture contains undiscernible ratios of contributors. Complex mixtures in which contributor ratios are not distinct demonstrate phenomena such as allele stacking or allelic dropout. Laboratories can overcome such interpretation challenges with rigorous internal laboratory validation studies, well-defined standard operating procedures, and rigorous training of the DNA analysts. The critical issue is not (or should not be) whether a particular method such as CPI is not scientifically valid (as it has been demonstrated to be valid when applied correctly) but whether that scientifically valid method has been applied correctly to the particular sample being analyzed.

As evidence of the putative unreliability of the CPI approach, the Report devotes significant discussion to what it describes as “systemic” problems with the subjective analysis of complex DNA mixtures. The Report cites purported failings of analyses conducted in Texas in 2015. The Report unfairly attributes the failings of the Texas laboratories -- in which dramatic shifts in statistics resulted from the laboratories changing the way in which they calculated the CPI statistics – on the CPI method itself. The Report broadly asserts that it was not until 2015 that attorneys learned for the first time “the extent to which DNA mixture analysis involved subjective interpretation” and that problems arose with CPI because existing guidelines did not clearly, adequately, or correctly specify the proper use or limitation of the approach. To cast doubt on the method itself based on an individual laboratory’s misapplication of the method is misguided at best or disingenuous at worst. Rather than spending pages detailing the occurrences in the Texas laboratories and concluding that the problem was “systemic” while dismissing those who reliably interpret complex DNA mixtures, the Report should have relied upon articles published in peer-reviewed journals by experts in the field describing the proper use and limitations of the CPI method to interpret complex DNA mixture profiles.

Four publications describe the proper, scientifically valid use of CPI.<sup>1</sup> Dr. John Butler devotes parts of several chapters in his 2015 publication on advanced topics in DNA interpretation specifically to the use and limitations of CPI in complex DNA mixture interpretation.<sup>2</sup> The Report gives but a passing nod to the comprehensive methodology paper published in BMC

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<sup>1</sup> Budowle, B, Onorato AJ, Callaghan TF, Della Manna A, Gross AM, Guerreri RA, et al. Mixture Interpretation: defining the relevant features for guidelines for the assessment of mixed DNA profiles in forensic casework. J. Forensic Sci. (2009); 54:810-21; Butler JM. Advanced Topics in Forensic DNA Typing: Interpretation. Oxford: Elsevier; 2015; Scientific Working Group on DNA Analysis Methods (SWGDAM). SWGDAM Interpretation Guidelines for Autosomal STR Scientific Working Group on DNA Analysis Methods (SWGDAM) SWGDAM Interpretation Guidelines for Autosomal Typing by Forensic DNA Laboratories. 2010.; Bieber F, Buckleton J, Budowle B, Butler, J and Coble M, Evaluation of Forensic DNA Mixture Evidence: Protocol for Evaluation, Interpretation, and Statistical Calculations using the Combined Probability of Inclusion, BMC Genetics, 2016

<sup>2</sup> Butler JM. Advanced Topics in Forensic DNA Typing: Interpretation. Oxford: Elsevier;

Genetics in 2016<sup>3</sup> that provides a detailed, specific set of rules for the use of CPI which the PCAST Report erroneously claims is lacking. The purpose of the article was to assist forensic laboratories that use CPI by providing a formal protocol for the proper use of CPI. The forensic DNA community has met the criteria set out by the PCAST Report by providing standardized protocols and methodology for the proper use of the CPI in complex mixture analysis. Nonetheless, ignoring published scientific literature, the Report, inexplicably concludes that the interpretation of complex DNA mixtures with the CPI statistic is inappropriately subjective and “clearly not foundationally valid.” To make such a sweeping claim in the face of publications authored by experts in the field seriously undermines confidence in the Report’s objectivity and reliability.

### **Latent Print Discipline**

The report concludes that the use of latent fingerprint analysis satisfies the requirements of scientific reliability. The Report goes on to suggest that judges insist that jurors be apprised of error rates, which are the subject of significant scientific/technical disagreement. This is an example of the Report's confusion of the roles of experts, counsel, the judge, and the jury. Error rate issue is an issue of fact -- for experts to testify about and juries to resolve -- not one of law.

In addition, although NDAA concurs with the Report’s conclusion that latent prints are a scientifically reliable discipline, that concurrence is based on a great deal of scientific and technical validation that goes well beyond the two black box studies cited in the Report. Also indicative of the internal incoherence of the Report’s methodology is its failure to apply its own criteria for evaluation of black box studies to the studies cited on latent fingerprint analysis. That is, having set out criteria for the assessment of black box studies (and having artificially and unnecessarily limited the scope of potential validation for latent fingerprint analysis to black box studies), the Report inexplicably fails to apply those criteria to the black box studies it cites in support of the scientific reliability of latent fingerprint analysis.

### **Firearms Analysis**

The science of tool mark identification, specifically firearms, is based on the premise that a tool mark can be individualized to the specific tool that produced it. Firearms identification involves the microscopic examination and comparison of cartridge casings and expended bullets to each other, and to test fires produced from known firearms. The unique features of each firearm, as designed by the firearm manufacturer, are transferred to the cartridge case and bullet whenever a weapon is fired. The cartridge case or shell is impressed with marks from contact with the metal surfaces of the gun’s firing and loading mechanisms, including the firing pin, breech face, ejector, extractor and magazine. In addition to marks left on the cartridge casing,

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<sup>3</sup> Bieber F, Buckleton J, Budowle B, Butler, J and Coble M, Evaluation of Forensic DNA Mixture Evidence: Protocol for Evaluation, Interpretation, and Statistical Calculations using the Combined Probability of Inclusion, BMC Genetics, (2016) 17:125.

as a fired bullet travels down the barrel of a gun, it will pick up impressed and striated tool marks (lands and grooves) that are generated by the working surface of the rifled bore of the barrel.

The PCAST findings with respect to firearms are especially puzzling as the Association of Firearm and Tool mark Examiners (AFTE) provided to the PCAST a comprehensive list of over 40 peer-reviewed published studies supporting the foundational aspects of the discipline and answering questions relating to other aspects of the discipline. This information is available at <https://afte.org/resources/wggun-ark>. This research includes a significant number of comprehensive experimental models involving close to a thousand examiners from the US and across the globe. The varied experimental models included numerous “consecutively manufactured barrel” tests, in which manufacturers provided a series of consecutively manufactured firearm barrels, which would be expected to be virtually identical. Trained examiners were asked to examine unknown fired bullets to determine whether they could correctly identify those bullets as having been fired from the barrel of a particular firearm. Other tests involved the effect of consecutive firing of firearms to determine how the wear on barrels and breech faces would affect the identification of fired bullets and cartridge casings. Still other tests involved microscopic studies of the reproducibility of tool marks on high velocity bullets fired through a single machine gun barrel. Various tests used double-blind procedures and studied false-positive and false-negative error rates and compared automated analyses systems to those of trained human examiners. The studies demonstrated that unique features of each firearm are transferred to cartridge casings and bullets and that trained examiners are able to correctly link related tool marks to the tool, i.e., the firearm that produced it with a high degree of accuracy.

PCAST, however, is critical of these studies. PCAST arbitrarily defined the acceptable parameters of validation studies and determined that the types cited by AFTE failed to meet those parameters. In comments regarding several cited studies, PCAST implies that these particular types of firearm validation studies are not challenging and the participants can determine the correct response by a process of elimination. Yet the PCAST members are neither forensic firearm scientists performing casework nor did they participate as examiners in these validation studies. PCAST unilaterally dismisses all work that does not comport with its arbitrary, singular experimental design. Years of research conducted prior to the PCAST report has established the scientific foundational validity of firearm/tool mark analysis.

### **Forensic Odontology**

Forensic dentists are highly-trained medical professionals and their methods employ well-documented and well-understood medical and forensic techniques. Forensic dentists undergo standard medical dental training during which they take the same courses as medical students in pharmacology, physiology, histology, and anatomy of the oral and facial structure.

By virtue of their experience reading x-rays and performing surgeries, forensic dentists are experts in comparing dentitions, pattern, and are well-versed in the injury and healing properties of human skin.

Forensic dentists perform bite mark evidence collection through the use of highly specialized photography and harvest injured skin from deceased victims. They analyze bite marks using very specific criteria and highly specialized computer programs and tools.

Best practices for comparisons include blinded suspect sample collection and a “lineup” of potential suspects. Board certified forensic odontologists undergo a rigorous training and examination process by the American Board of Forensic Odontology.

Studies cited by the PCAST Report in support of its rejection of forensic odontology have been thoroughly discredited in court. For example, both the cadaver studies and 2-D and 3-D studies by Mary and Peter Bush were poorly designed and executed and as a result, did not reliably demonstrate anything. The AAFS study was similarly flawed. The authors admit that the small number of participants and mid-study rule changes, among other problems, meant the study proved only the obvious fact that the best possible evidence should be used when conducting bite mark analysis and comparison.

Forensic odontology is an important tool, for both prosecution and defense, especially in child abuse cases. These cases commonly involve a limited number of people who have access to the child and comparisons between this “closed population” of suspects can often reliably exclude all but one suspect who may be included as a possible perpetrator based on specific similarities between the suspect’s dentition and the bite mark injury. Judges, juries, potential defendants and victims all need this valuable tool in the pursuit of justice. PCAST’s study of historic cases in which convictions were vacated do not address vast improvements in forensic odontology and are not relevant to forensic practices today.

### **Closing**

Finally, it should be noted that the Report applies only selectively its assertion that numerous peer reviewed and published studies are required. In several instances (for example, cognitive bias) the Report relies upon a single study on an isolated topic that has not been replicated by other researchers and generalizes the single study’s findings to all analogous forensic disciplines. The Report does this despite its requirement that proponents of a particular discipline support their claims with numerous peer-reviewed studies. Cherry-picking studies that report findings that support the report’s positions, but that fail to satisfy the report’s own criteria for feature comparison methods, further exposes the Report’s biases and, in doing so undermines its credibility.

Throughout its report, PCAST announces, by fiat, certain broad and sweeping definitions and sets of criteria without a single attribution to extant scientific authority in support of these assertions. Among these are its definitions of scientific validity (for both objective and

subjective methods); validity as applied; and the assertion that the only means by which these scientific concepts can be established is via multi-part tests, apparently created adhoc by the PCAST working group.

In its report, PCAST provides three types of evidence that it argues undermines, “from a scientific standpoint,” “the continuing validity of conclusions that were not based on appropriate empirical evidence.” These are Innocence Project exonerations; the 2009 NRC Report; and “the scientific review in this report by PCAST, the leading scientific advisory body established by the Executive Branch, finding that some forensic feature-comparison methods lack foundational validity.”

PCAST’s attempt to bootstrap its own qualifications as justification for the exclusion of feature comparison evidence, and its attempt to appeal to the reader’s deference to its own political authority, is the height of irony (and hypocrisy) for a group that criticizes feature comparison methods because of their reliance on *skill and experience* rather than upon foundational authorities.

In addition, while criticizing the feature comparison disciplines for failing to rely on adequate empirical evidence to establish their foundational validity, PCAST, ironically, feels no need to rely upon any foundational scientific material to support its *own* numerous scientific edicts. Instead, PCAST bases its assertions on “the *ipse dixit*” of its own alleged expertise in this field. Setting aside that PCAST has no forensic expertise *per se*, the *ipse dixit* of the expert is not a sufficient basis upon which to admit scientific testimony in a courtroom. Likewise, it offers no reason to credit the assertions made in its Report.

In the end, the report offers an appeal to its own authority as a justification for courts to rely on its recommendations to exclude feature comparison evidence. Not only is this dangerous but it is well beyond the Report’s purview. Assertions by the Attorney General and the FBI Director that they will not heed the report’s recommendations constitute a powerful repudiation of the methods and conclusions of the PCAST process. Experience shows these disciplines offer reliable and powerful evidence in a court of law. It is therefore entirely inappropriate for the report to suggest otherwise to this country’s courts.

To address legitimate questions surrounding forensic science, NDAA supports establishment of an Office of Forensic Science within the Department of Justice as recommended by Senators Cornyn and Leahy in 2014 in the Criminal Justice and Forensic Science Reform Act of 2014. One of the Act’s recommendations is a Comprehensive Research Strategy and Agenda for fostering and improving peer-reviewed scientific research relating to the forensic science disciplines, including research addressing validity, reliability, and accuracy in the forensic science disciplines. It is our understanding that PCAST has been tasked with generating a research strategy within the Office of Science and Technology Policy (OSTP) under your Office. An Office of Forensic Science, in our opinion, should be charged with these tasks in order to help facilitate all the partners collaboratively within the forensic community and the Department of Justice. In our view, the Department of Justice is better suited for this task than the OSTP, due to the



broad range of subjects it is asked to study such as climate change, antibiotic resistance and education. We support peer-reviewed scientific research relating to the forensic science disciplines to continue to improve validity, reliability, and accuracy.

Sincerely,

A handwritten signature in dark ink, reading "Michael A. Ramos". The signature is written in a cursive style with a large, sweeping initial "M" and a decorative flourish at the end.

Michael A. Ramos

President

National District Attorneys Association