

Summer 2005 memo from FBI Lab Director Dwight Adams to FBI Director Robert Mueller explaining why the bullet lead science was being ended and stating that prosecutors should no longer rely on past bullet matches made by the FBI.

I have decided, as of yesterday, to discontinue the use of the technique known as bullet lead analysis.

Background: The FBI Laboratory independently sought an impartial scientific assessment of bullet lead analysis as early as 2000 through a contract with the Department of Energy, Ames Laboratory and again in 2002 through a contract with the National Research Council (NRC). The NRC issued their report on February 9, 2004. I specifically asked the committee chair if the FBI Laboratory should discontinue the use of bullet lead analysis while we make the recommended improvements and they replied "You should not discontinue this technique, only enhance it." Nevertheless, we did discontinue the test pending the outcome of our review of all NRC recommendations.

The NRC was asked three questions: (1) was the analytical method currently used sound? (2) were the statistics for comparison sound? and (3) were the conclusions reached with the analytical method and statistical comparisons valid?

ANALYTICAL METHOD - In short, the NRC stated that the "current analytical instrumentation used by the FBI is appropriate and is the best available technology. . . . the elements selected by the FBI for analysis are appropriate . . ."

STATISTICS FOR COMPARISON - The NRC recommended that the FBI use a different statistic than the one previously used. Much of the past year has been devoted to reviewing the different statistical approaches recommended by the NRC.

INTERPRETATION ISSUES - To have value as evidence in court, the interpretation of results depends on the quality of the chemical analysis, the statistical comparison, and the determination of the significance of the comparison. It is this last point which leads me to discontinue the technique. The following excerpts from the NRC report speak directly to the underlined portion:

"Variations among and within lead bullet manufacturers make any modeling of the general manufacturing process unreliable and potentially misleading in (bullet lead) comparisons."

". . . distribution information on bullets . . . either does not exist or is considered proprietary, and the committee was unable to assess regional distribution patterns. For these reasons, unlike the situation with some forms of evidence such as DNA . . ., it is not possible to obtain accurate and easily understood probability estimates that are directly applicable."

BOTTOM LINE - our techniques are suitable and reliable. The recommended changes in statistical procedures would enhance our existing comparisons and provide a sound basis for declaring two samples as indistinguishable. However, the probative value of these findings and how that probative value is conveyed to a jury "remains a critical issue." In the end, it did not matter that we were using the best available technology. What mattered was our inability to determine the significance of our comparisons. We cannot afford to be misleading to a jury or state that two samples are indistinguishable, but not be able to state the significance of that fact or what it means.

FOLLOWUP ACTION - We plan to send a letter to all prosecutors that utilized this technology and provide them with the above information and direct them to the NRC report. We plan to simultaneously issue a press release confirming the above. We plan to discourage prosecutors from using our previous results in future prosecutions.

**2004 FBI e-mails in which lab employees
acknowledge that prior bullet lead matches would
be reversed if the lab used new statistical
methods recommended by the National Academy
of Sciences.**

methods that have been used are valid, and all should have been noted in the report that was prepared at the time. In essence, it is merely a choice of valid statistical methods, and defense experts were and still are free to present their own findings under a different statistical method.

-----Original Message-----

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From: [redacted] (LD) (FBI)
Sent: Tuesday, August 03, 2004 2:42 PM
To: ADAMS, DWIGHT E. (LD) (FBI)
Subject: FW: updated bullet lead memo
Importance: High

UNCLASSIFIED
NON-RECORD

FYI

-----Original Message-----

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From: [redacted] (LD) (FBI)
Sent: Tuesday, August 03, 2004 1:10 PM
To: [redacted] (OGC) (FBI); [redacted] (OGC) (FBI)
Cc: DIZINNO, JOSEPH A. (LD) (FBI)
Subject: FW: updated bullet lead memo
Importance: High

UNCLASSIFIED
NON-RECORD

I was unable to attend the meeting referred to below, but this closes part of the loop on the bullet lead issue. I touched base with Joe on this issue yesterday.

Basically, National Academy of Sciences (NAS) recommended using a different statistical model in doing certain calculations in the bullet lead analysis - it deals with the statistical interpretation of the data to help determine whether there is a match. The Laboratory had some reservations about adopting their proposed model, and so the Chemistry Unit conducted a study with 100 randomly selected cases, utilizing a variety of statistical models for each one. The results of the study show that a different statistical model actually leads to more conservative results in the large majority of the cases.

Note that in a very few cases, the model the Lab now prefers to use leads to a less conservative finding than that which was reported out at the time. Joe asked me to consider whether those cases would need to be contacted. In my opinion, they would not. All of the statistical methods that have been used are valid, and all should have been noted in the report that was prepared at the time. In essence, it is merely a choice of valid statistical methods, and defense experts were and still are free to present their own findings under a different statistical method. Please let me know if you wish to discuss.

The Lab plans to do a presentation on this study at the next American Forensic Society meeting, and is preparing two publications on the issue for forensic journals. Additionally, Joe would like to reach out to the two DOJ attorneys he and [redacted] met with on the bullet lead issue earlier, in order to update them on the study findings. If either of you would like to attend that meeting, please let me know. Otherwise, I'll try and set something up for [redacted] and myself fairly soon.

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Thanks -
[redacted]

[redacted] (LD) (FBI)

From: [redacted] (LD) (FBI)
Sent: Wednesday, March 09, 2005 4:02 PM
To: ADAMS, DWIGHT E. (LD) (FBI)
Subject: RE: Bullet Lead Update

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Dwight,

I hear what you're saying and understand your concern. I would add, however, that this is a very tight examination now. There will be no such thing as an inconclusive, provided we could do the examination. Either they'll match or they won't using our revised statistical protocol. The exception may be with fragments where we can at least rule out a common source of the lead, but the new technique will not allow us to use a single measurement to claim that we have a match.

The only reason that we had issues in the past was because we allowed for a subjective variable...namely "experience"....to somehow figure into whether a call was made or not. Now it is all done behind the scenes with our statistical program. Looking at all the cases that we reported since 1996, only 1.4% of the cases resulted in a different report being issued. To the best of our ability, we have identified why those 7 cases have a different result today and it is mainly due to the use of "chaining"... some of it used quite liberally.

I think some of your concern may be due to discussions that were held last year when we were looking at the use of the "equivalence test". If we had continued with that method of assessing the data, we would have been making a lot more false exclusions. As you will recall, we switched horses at that point and did the false positive probability study that will allow us to use a very traditional statistical technique...namely the student t test. I can't imagine anyone really questioning the use of this statistical technique in the scientific community.

As far as peer-review of the method, I hope that you will also consider the NRC's report as part of the peer-review. We have done our best to meet their comments and recommendations.

I am also encouraged that since you aren't yet convinced about whether we should proceed or not until the process is finished, that I still have a chance to win you over on this.

Thanks for hearing me out. I greatly appreciate it!

[redacted]
Chief
Chemistry Unit
Laboratory Division
Quantico, VA 22135

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FAX [redacted]

2005 FBI e-mail stating the lab scientists should no longer use its 1.3 million estimate of the total number of bullets made in a single batch of lead because it could be misleading.

Message

possessing bullets from the same CIVL.

You are right that the database has limitations, but it is what the NRC recommended we use to estimate false positive matches. In the end, that is all we can ever do when we are determining uncertainties... give it our best estimate based on what we have available to work with.

In the end, you are right, in that we can't give an exact number for anything related to bullet lead with 100% certainty, but that is why it is circumstantial evidence. We can make well-educated estimates, however, that help the judge and jury weigh in their own mind how probative (and unique) the information is.

Thanks,

Marc LeBeau
Chief
Chemistry Unit
Laboratory Division
Quantico, VA 22135
(703) 632-7408
FAX: (703) 632-7411
Cell: (202) 439-4408

-----Original Message-----

From: DIZINNO, JOSEPH A. (LD) (FBI)
Sent: Thursday, May 12, 2005 9:15 AM
To: LEBEAU, MARC A. (LD) (FBI)
Cc: CHOI, AMANDA ELLER (LD) (FBI); FRAM, ROBERT (LD) (FBI)
Subject: RE: Bullet Lead

UNCLASSIFIED
NON-RECORD

Marc,

I'd like to try to answer your questions and reiterate why I believe that we should leave 2 of these statements in the letter:

- 1) Saying that the examiner cannot testify to such facts as to how many bullets may have come from the same melt, I believe is true. You have indicated that the NRC said we should make a reasonable estimate, for example they suggested we say a billion .22LR could be produced from one CIVL. Where did the NRC come up with this number? I'm sure that it varies from manufacturer to manufacturer, from caliber to caliber or simply by chance of the process. Therefore, I don't believe that we can testify about how many bullets may have come from the same melt and our estimate may be totally misleading because we simply do not know for that particular bullet fragment in that case.
- 2) Saying how many bullets from a different melt may have a similar composition, I also believe is true. You indicate that the NRC said we should state that there was less chance of a bullet matching a different melt than one from the same melt. That, to me, however, is different from saying how many bullets from a different melt may have a similar composition. Also, you state that our own studies have shown that the chances of a false positive match are better than 1 in 5000. First, our database, compared to the huge world of bullets, is very small. Therefore, a good argument could be made that our database does not reflect the much larger world of bullets. I believe that we cannot say how many bullets from a different melt may have a similar composition because again we simply do not know for that particular bullet fragment in that case.
- 3) Your last point about geographic distribution of bullets being known by the manufacturer is well taken and I believe that we should modify this language.

If you have any other questions, please do not hesitate to give me a call.

11/23/2005

2006 FBI affidavit which uses the 1.3 million estimate for the total number of bullets made in a single batch of lead despite prior warning that it could be misleading.

CIRCUIT COURT for BALTIMORE COUNTY

James Allen Kulbicki

Plaintiff,

v.

State of Maryland

Defendant.

CRIMINAL NO. 93CR0530

AFFIDAVIT OF DIANA M. WRIGHT, Ph.D.

I, Diana M. Wright, state for the record:

BACKGROUND AND EXPERIENCE IN COMPARATIVE BULLET LEAD ANALYSIS

1. I am employed as a Forensic Examiner by the Federal Bureau of Investigation (FBI), and I am currently assigned to the FBI Laboratory, Scientific Analysis Section, Chemistry Unit, in Quantico, Virginia.

2. I obtained a Bachelor of Science degree in Chemistry from the College of Saint Elizabeth, Morristown, New Jersey and a Doctor of Philosophy degree in Chemistry from the University of Maryland, in College Park, Maryland.

3. I have been employed by the FBI Laboratory since August 3, 1997 where I was assigned to the Materials and Devices Unit (MDU). This unit later changed its name to the Materials

Analysis Unit (MAU). The subunit that was responsible for the analysis of bullet lead was incorporated into the Chemistry Unit (CU) in February, 2002, where the exam was performed until it was discontinued in September, 2005.

4. Comparative bullet lead analysis involves the physical and chemical examination of the lead portion of expended bullets, fragments of bullets, and bullets loaded into cartridge cases which are considered to be "live" or functional rounds of ammunition. Evidence of this type is submitted to the FBI Laboratory in support of investigations involving criminal cases from law enforcement agencies throughout the United States. The majority of this evidence is submitted by city, county and state agencies. This evidence is subjected to processes which include physical examination and comparison of the fired bullets to the bullets loaded in the live ammunition. These examinations include physical measurements, weight comparisons, removal of surface contamination or effect coating (e.g. copper plating or jacketing material), and sectioning of the lead portion of the bullet in order to take replicate measurements of the evidence. The chemical examination requires digestion of the lead in an acid solution, along with appropriate commercially-available standard reference materials, followed by analysis using instrumental methods.

5. During my career with the FBI Laboratory, my areas of expertise as a Forensic Examiner have included comparative bullet lead analysis, gunshot residue analysis, and the analysis and comparison of paints, tapes, and polymeric materials. I have supervised laboratory chemists and am responsible for the analysis and interpretation of the data obtained during examination of items of evidence. Upon a complete and thorough technical and administrative review of all data generated in a case, I prepare a laboratory report stating the conclusions I derived from the work performed. I also testify to my results and conclusions upon request.

6. As a Forensic Examiner, I have been responsible for the analysis of over 250 cases during my tenure with the FBI Laboratory. I have issued reports regarding the results of my

analyses in each case, and have been responsible for the review and verification of the results and conclusions of other forensic examiners.

7. In my position with the FBI Laboratory, I have testified to the results of my analyses eleven times, both in trial and admissibility hearings, across the United States, including one testimony provided at the request of the defense.

8. In the nine years that I have been involved in the field of comparative bullet lead analysis, I have had the opportunity to present the findings of research in this area in the form of scientific posters, oral presentations, and/or publications. The citations for this work are as follow:

Wright, Diana M. and LeBeau, Marc A. "An Analytical Approach to Comparative Bullet Lead Analysis: Physical and Chemical Aspects of Discrimination." Poster presented at the 57th American Academy of Forensic Sciences meeting, New Orleans, Louisiana, February 2005.

Wright, Diana M. and LeBeau, Marc A. "Choosing a Statistical Method for the Data Assessment of the Compositional Analysis of Bullet Lead." Poster presented at the 57th American Academy of Forensic Sciences meeting, New Orleans, Louisiana, February 2005.

Wright, Diana M. and LeBeau, Marc A. "The FBI Laboratory's Response to Recommendations Regarding Comparative Bullet Lead Analysis." Oral presentation at the 57th American Academy of Forensic Sciences meeting, New Orleans, Louisiana, February 2005.

Koons, R.D. and Grant D.M. "Compositional Variation in Bullet Lead Manufacture." *Journal of Forensic Science*. 47(5), Sep 2002.

9. I have also attended meetings, symposia and conventions to remain current with the field. I have had continuing education in the specialized instrumentation used to perform elemental examinations, toured ammunition manufacturing plants and smelters that refine recycled battery lead into alloys used to manufacture bullets, and routinely read scientific journals and publications that contain research articles and papers in the areas of forensic analysis of metals, advances in methods and instrumentation used to analyze elements, and general analytical chemistry.

10. See attachment A for a copy of my curriculum vitae.

The Basis of Comparative Bullet Lead Analysis

Examination of Physical Characteristics

11. As with many mass-produced commodities, lead bullets are readily available in many shapes, sizes, and designs. Bullets may be commonly found in retail outlets for a wide variety of firearms and end uses. The caliber of the firearm determines the bullet size and shape is often a function of its utility. However, styles that include full or partial jacketing, or ridges referred to as cannelures, are often influenced by marketing trends or ease of recognition in the production setting. Each of these features can be used to discriminate bullets and bullet fragments from bullets loaded as components of functional ammunition.

12. As an example, just as a truck fender would not be concluded to have come from a compact car, a bullet fragment that weighs more than an intact bullet would indicate that these two specimens were not manufactured in the same product line. Therefore, the fragment and the bullet in the live cartridge would be considered forensically unrelated with respect to the bullet evidence. In the same manner, a bullet fragment that contained a copper jacket would be readily

